US007748018B2

(12) **United States Patent**
Young et al.

(10) **Patent No.: US 7,748,018 B2**
(45) **Date of Patent: Jun. 29, 2010**

(54) **ARRANGING CHANNEL INDICATORS IN A TELEVISION SCHEDULE SYSTEM**

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(73) Assignee: **Starsight Telecast, Inc.**, Fremont, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1010 days.

(21) Appl. No.: **10/961,008**

(22) Filed: **Oct. 7, 2004**

(65) **Prior Publication Data**

US 2005/0251828 A1 Nov. 10, 2005

Related U.S. Application Data

(63) Continuation of application No. 09/132,479, filed on Aug. 11, 1998, now abandoned, which is a continuation-in-part of application No. 08/033,773, filed on Mar. 19, 1993, now Pat. No. 5,353,121, which is a continuation-in-part of application No. 07/579,555, filed on Sep. 10, 1990, now abandoned, and a continuation-in-part of application No. 07/916,043, filed on Jul. 17, 1992, now abandoned, which is a continuation of application No. 07/778,404, filed on Oct. 17, 1991, now Pat. No. 5,151,789, which is a continuation-in-part of application No. 07/428,620, filed on Oct. 30, 1989, now abandoned.

(51) **Int. Cl.**
G06F 3/00 (2006.01)
G06F 13/00 (2006.01)
H04N 5/445 (2006.01)

(52) **U.S. Cl.** **725/47**; 725/40; 725/50

(58) **Field of Classification Search** 725/44, 725/46, 47
See application file for complete search history.

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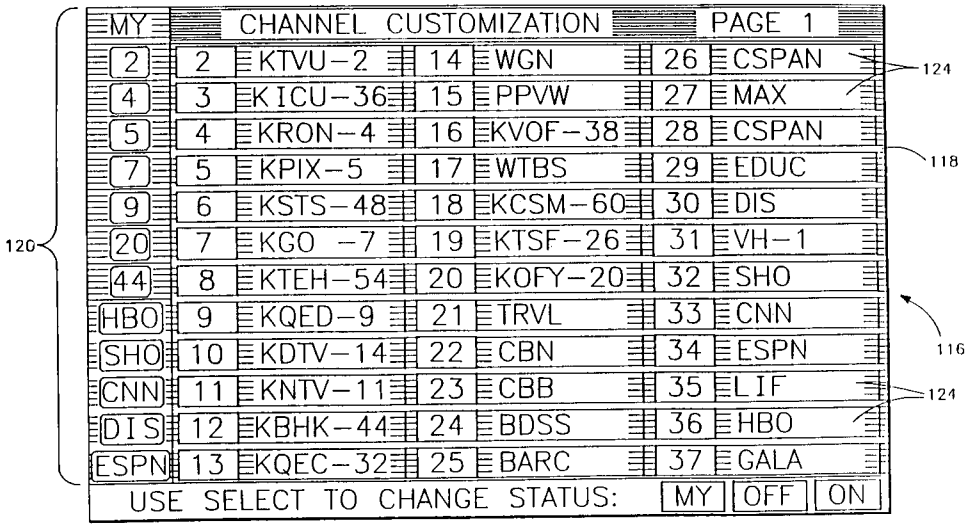
Primary Examiner—Scott Beliveau
Assistant Examiner—Bennett Ingvoldstad
(74) *Attorney, Agent, or Firm*—Ropes & Gray LLP

(57) **ABSTRACT**

Screen for a user interface of a television schedule system and process consists of an array of irregular cells, which vary in length, corresponding to different television program lengths of one half hour to one-and-one half hours or more. The array is arranged as three columns of one-half hour in duration, and twelve rows of program listings. Some of the program listings overlap two or more of the columns because of their length. Because of the widely varying length of the cells, if a conventional cursor used to select a cell location were to simply step from one cell to another, the result would be abrupt changes in the screen as the cursor moved from a cell of several hours length to an adjacent cell in the same row.

29 Claims, 28 Drawing Sheets



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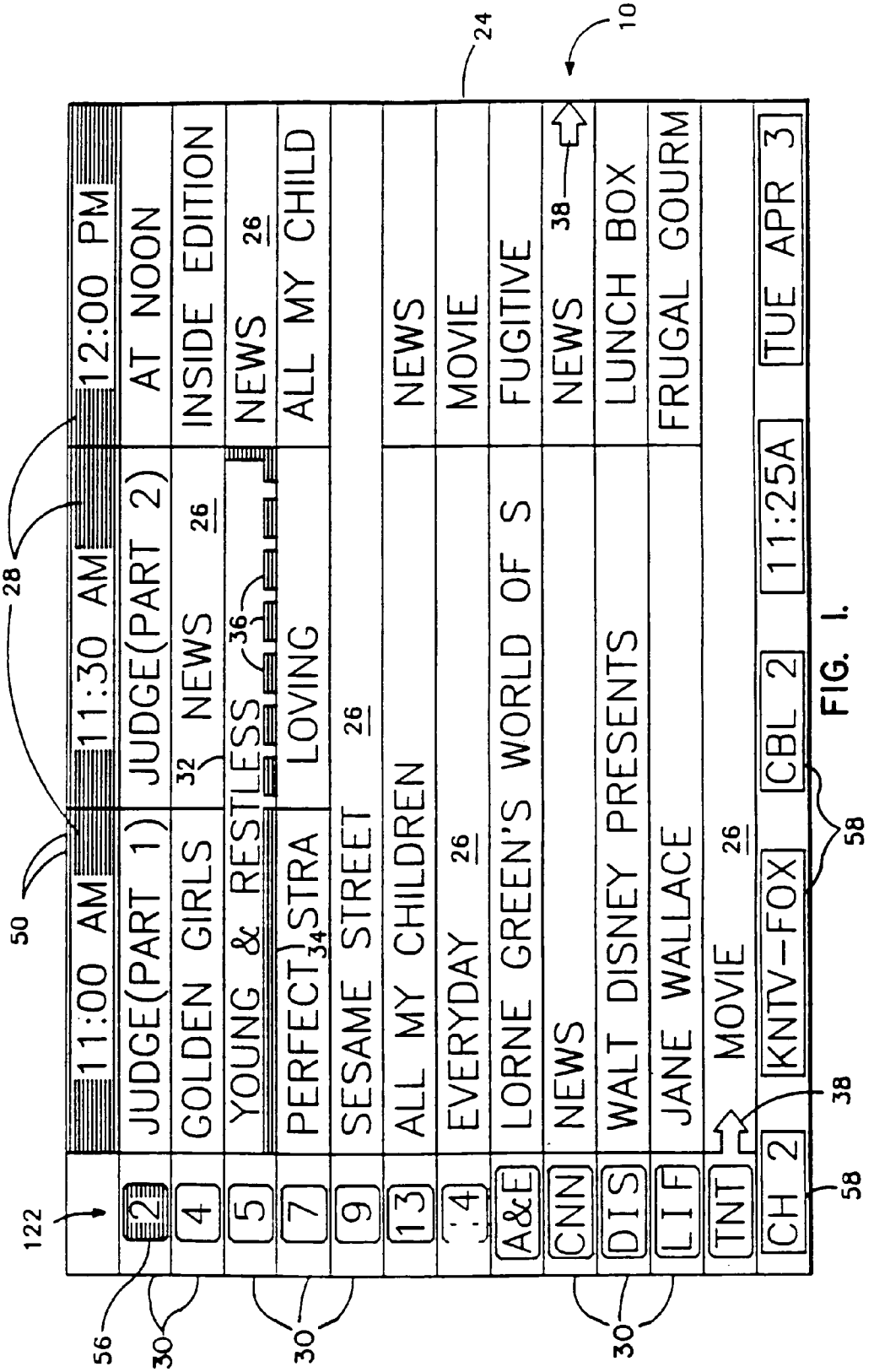
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13 ALL MY CHILDREN NEWS
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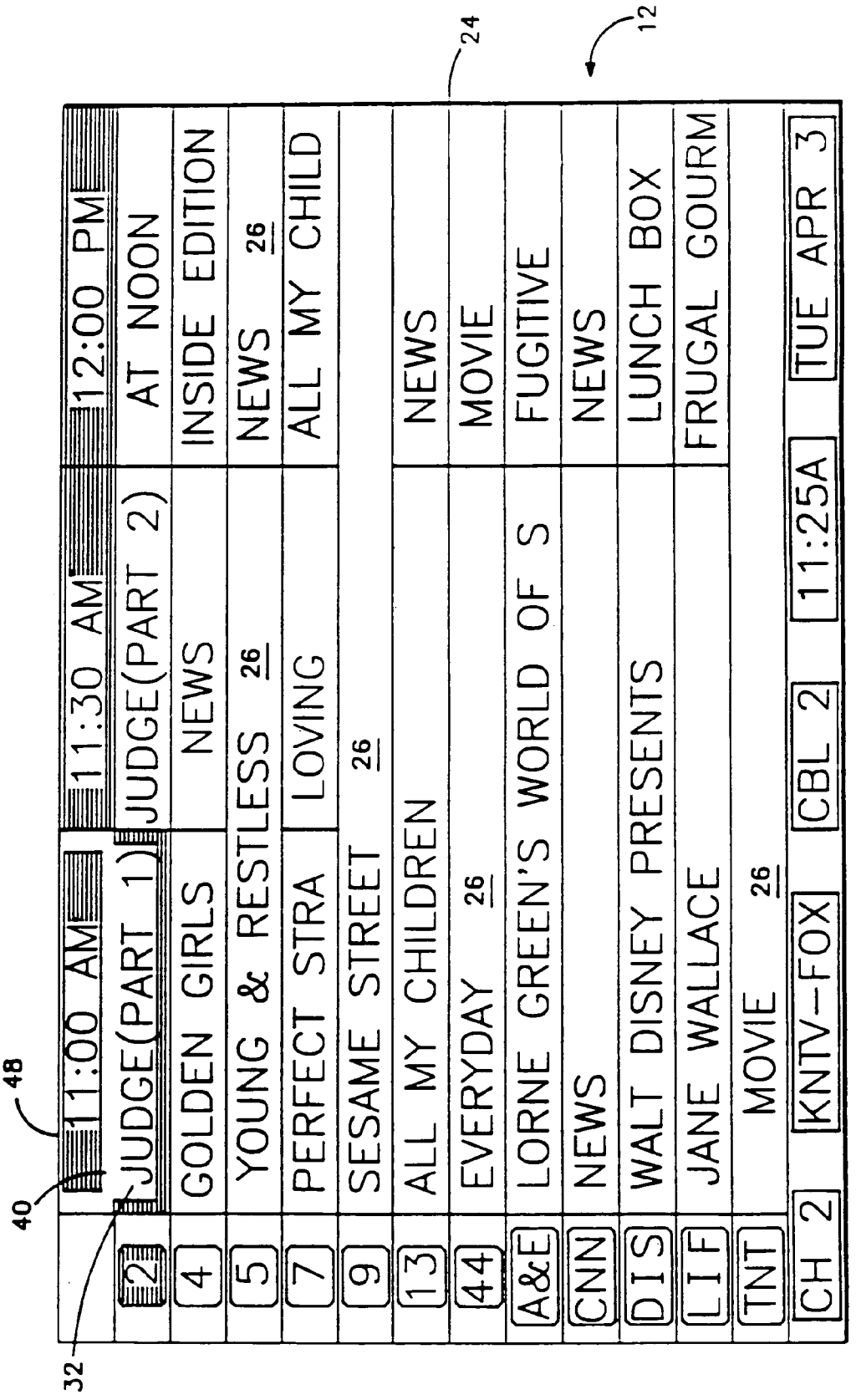
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FIG. 2.

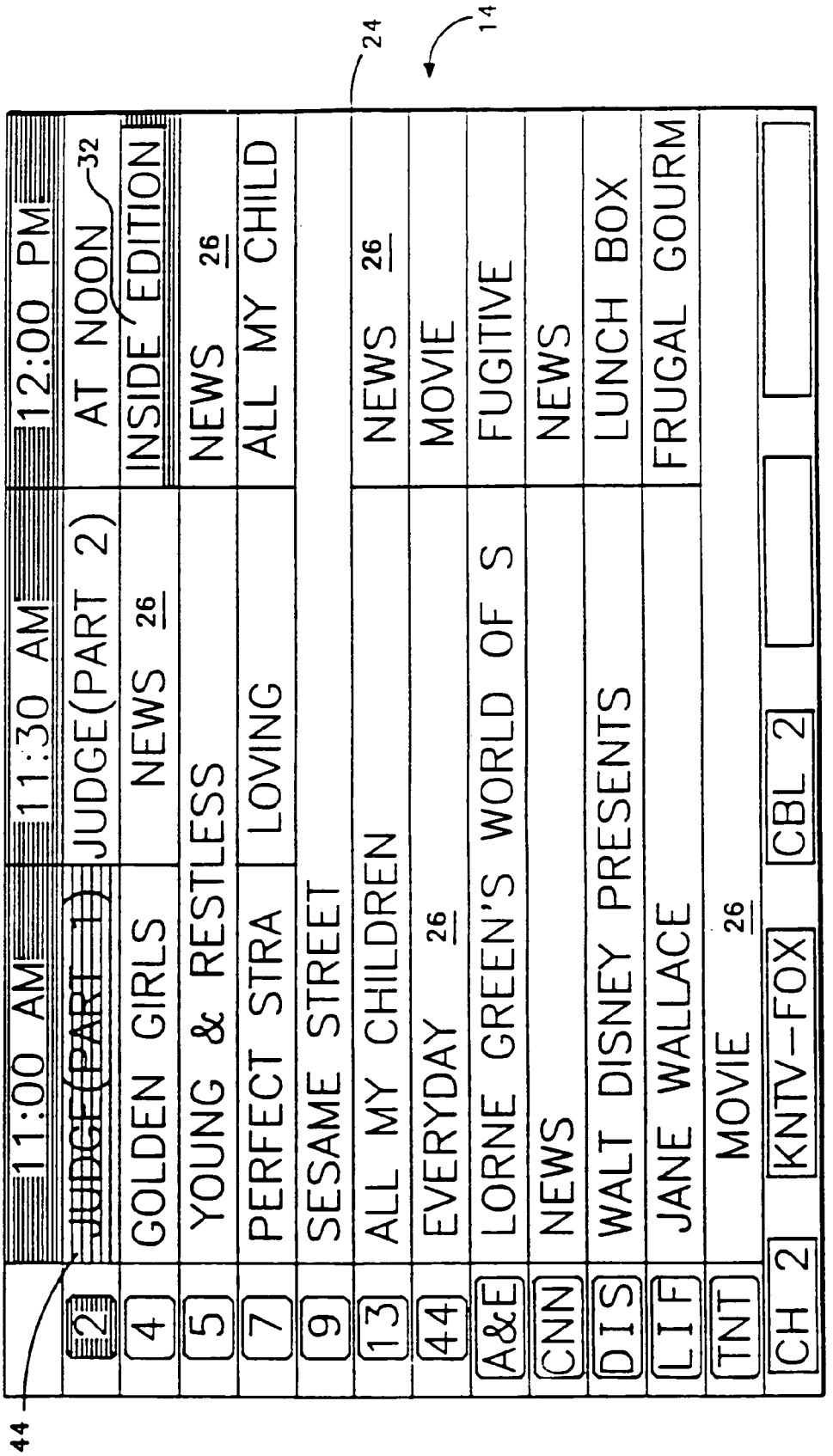
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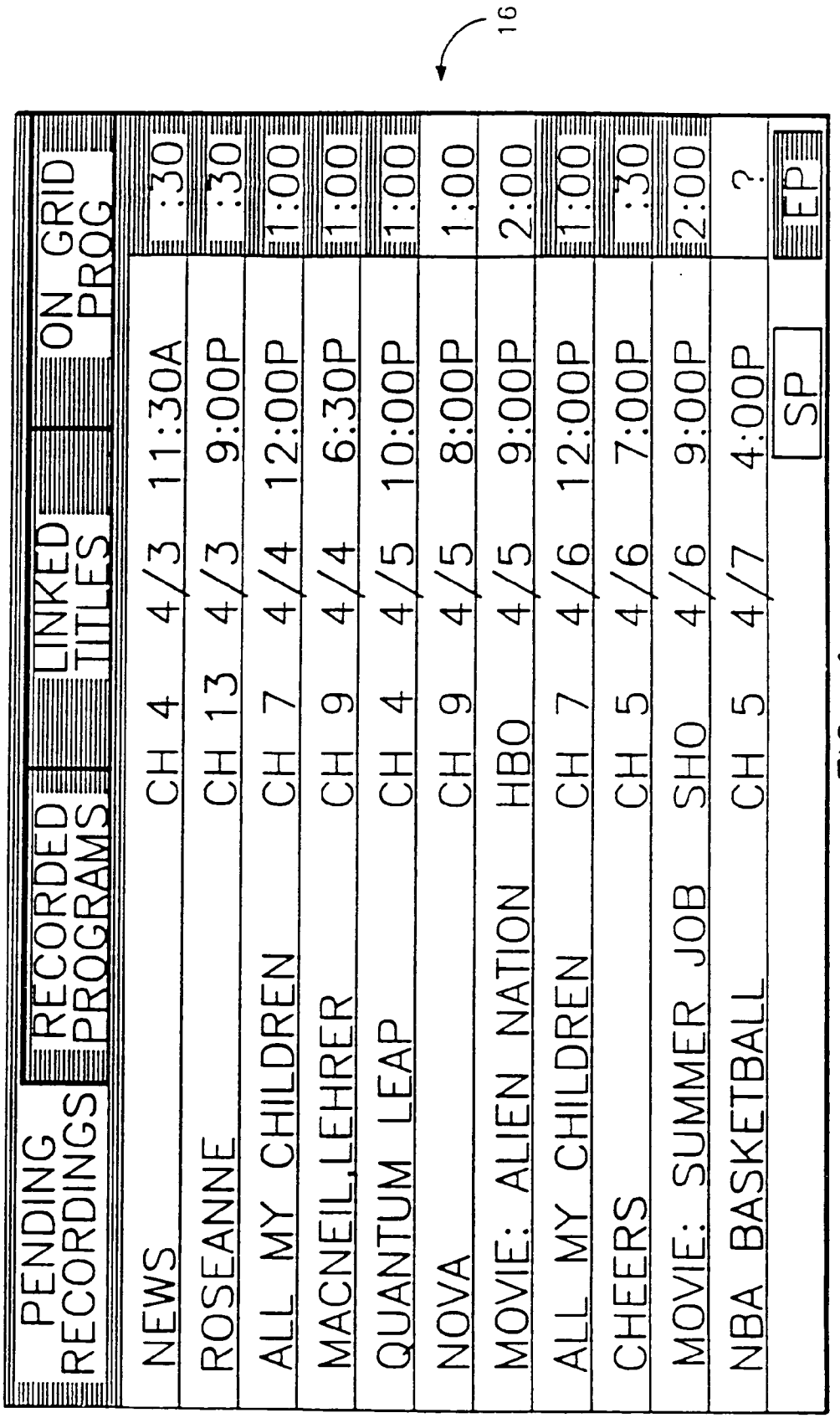
FIG. 3.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ROSEANNE CH 13 4/3 9:00P :30
ALL MY CHILDREN CH 7 4/4 12:00P 1:00
MACNEIL,LEHRER CH 9 4/4 6:30P 1:00
QUANTUM LEAP CH 4 4/5 10:00P 1:00
NOVA CH 9 4/5 8:00P 1:00
MOVIE: ALIEN NATION HBO 4/5 9:00P 2:00
ALL MY CHILDREN CH 7 4/6 12:00P 1:00
CHEERS CH 5 4/6 7:00P :30
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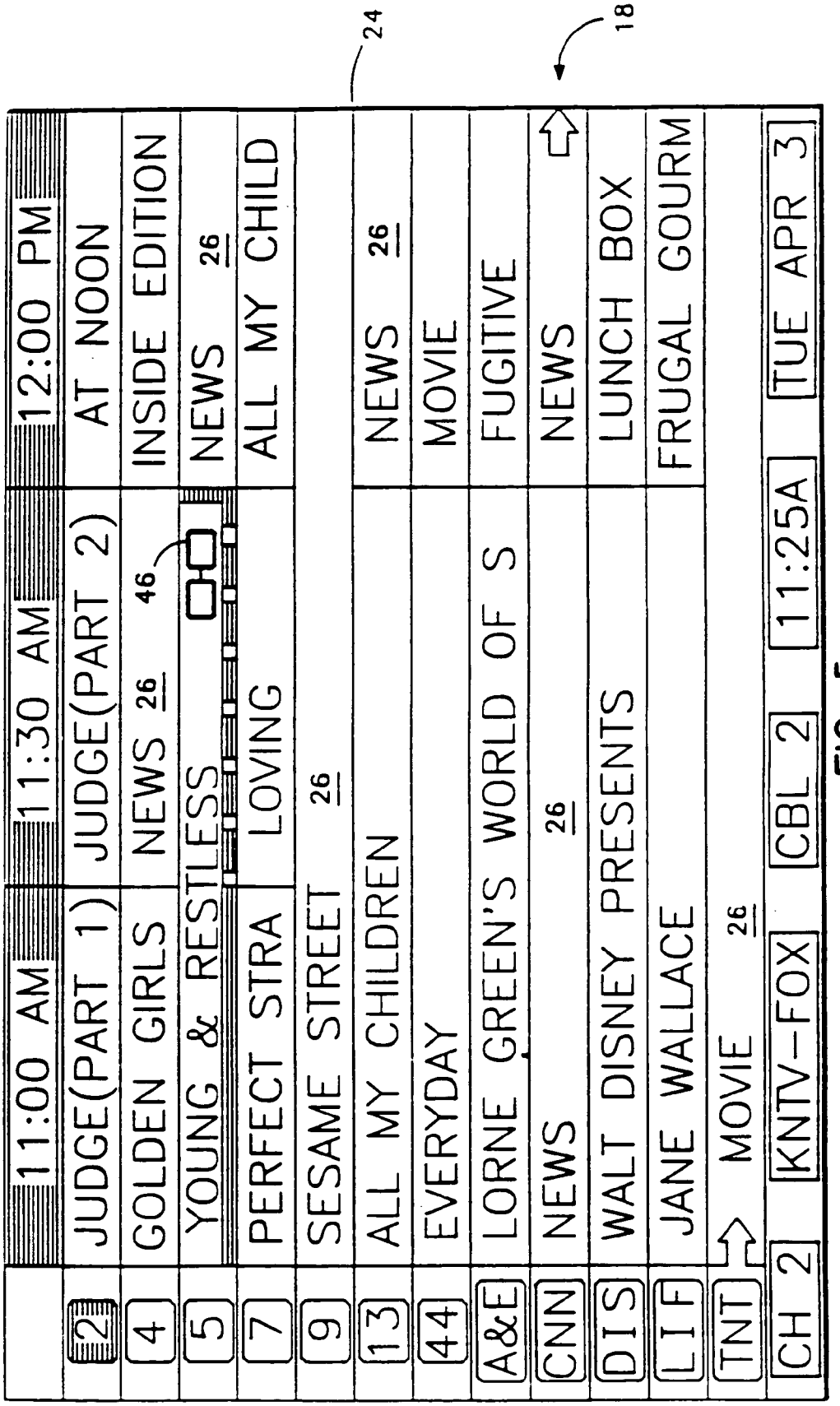
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TUE APR 3

FIG. 5.

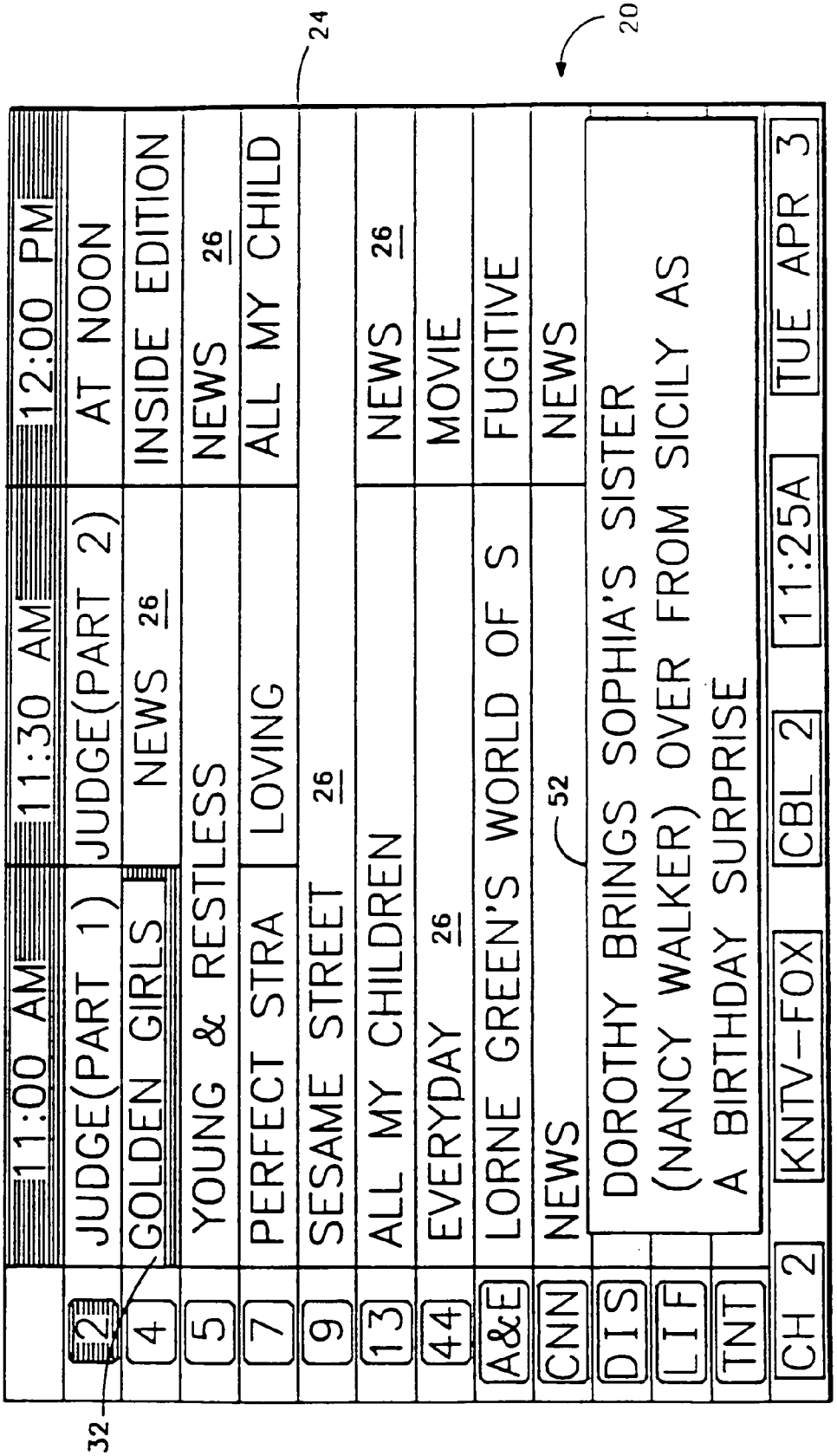
11:00 AM
11:30 AM
12:00 PM
24
20
32
2
JUDGE(PART 1)
JUDGE(PART 2)
AT NOON
4
GOLDEN GIRLS
NEWS 26
INSIDE EDITION
5
YOUNG & RESTLESS
NEWS 26
7
PERFECT STRA
LOVING
ALL MY CHILD
9
SESAME STREET 26
13
ALL MY CHILDREN
NEWS 26
44
EVERYDAY 26
MOVIE
A&E
LORNE GREEN'S WORLD OF S
FUGITIVE
CNN
NEWS 52
NEWS
DIS
DOROTHY BRINGS SOPHIA'S SISTER
LIF
(NANCY WALKER) OVER FROM SICILY AS
TNT
A BIRTHDAY SURPRISE
CH 2
KNTV-FOX
CBL 2
11:25A
TUE APR 3

FIG. 6.

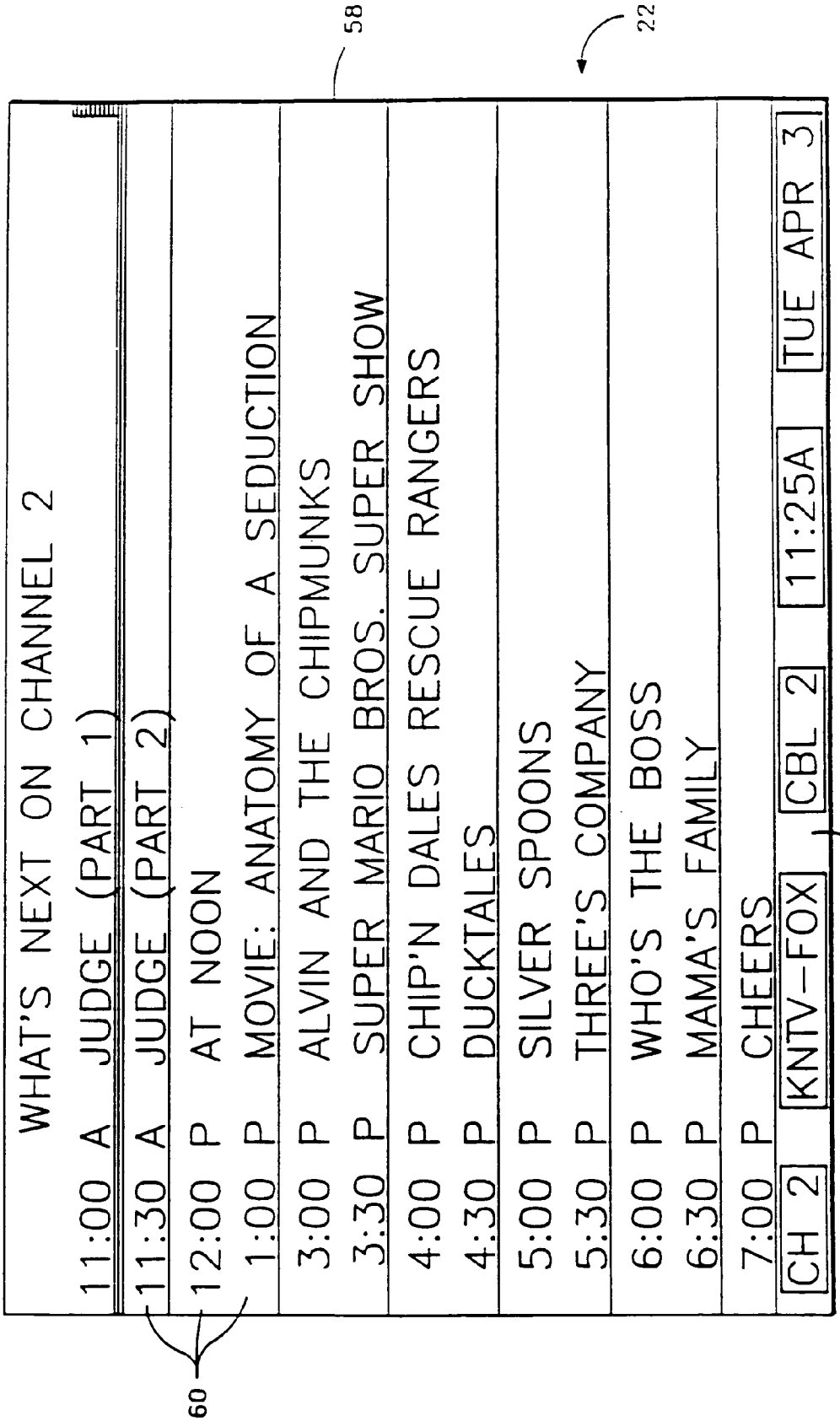
58
22
WHAT'S NEXT ON CHANNEL 2
11:00 A JUDGE (PART 1)
11:30 A JUDGE (PART 2)
12:00 P AT NOON
1:00 P MOVIE: ANATOMY OF A SEDUCTION
3:00 P ALVIN AND THE CHIPMUNKS
3:30 P SUPER MARIO BROS. SUPER SHOW
4:00 P CHIP'N DALES RESCUE RANGERS
4:30 P DUCKTALES
5:00 P SILVER SPOONS
5:30 P THREE'S COMPANY
6:00 P WHO'S THE BOSS
6:30 P MAMA'S FAMILY
7:00 P CHEERS
CH 2
KNTV-FOX
CBL 2
11:25A
TUE APR 3
60
62

FIG. 7.

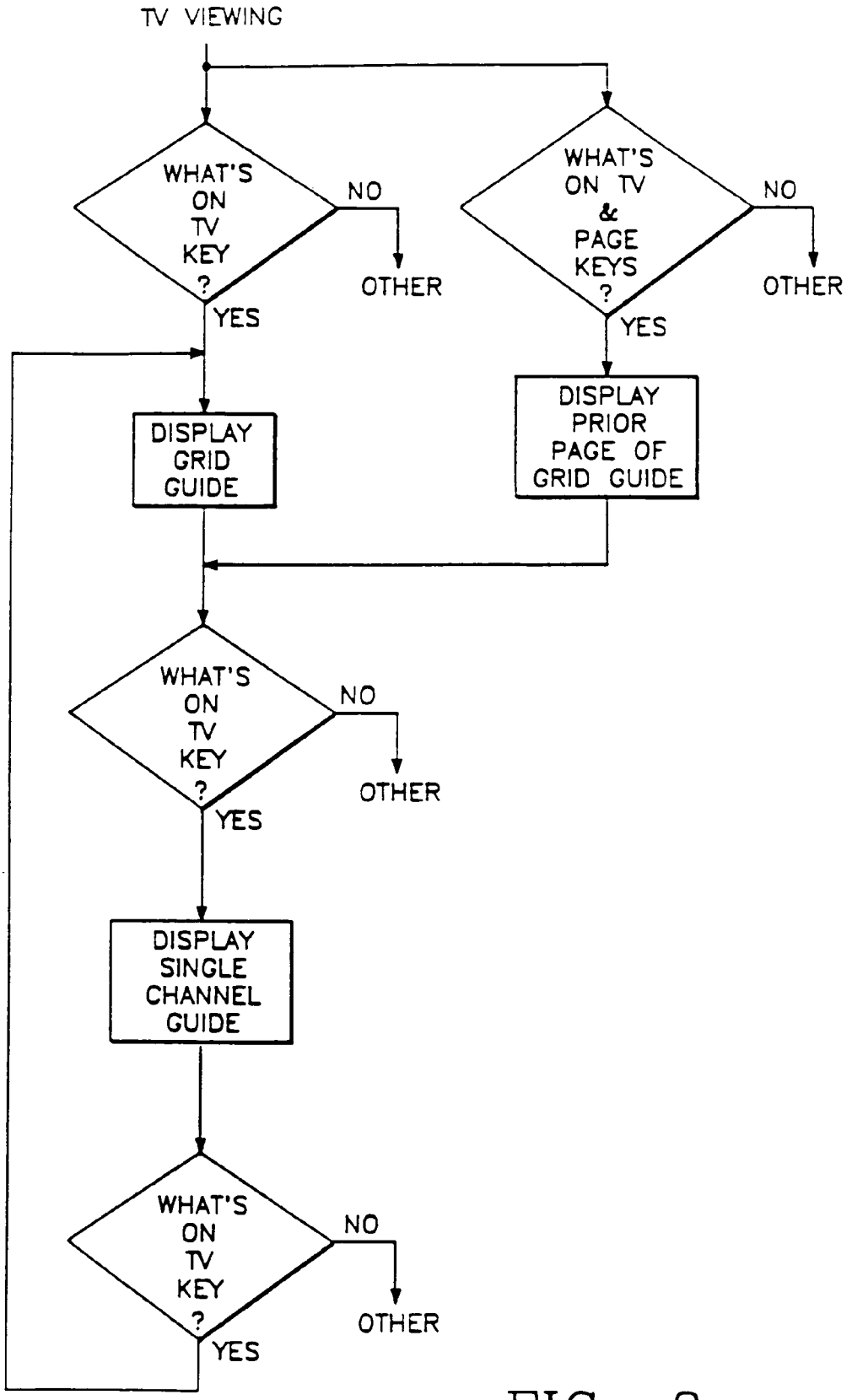
TV VIEWING
WHAT'S ON TV KEY ?
NO
OTHER
YES
WHAT'S ON TV & PAGE KEYS ?
NO
OTHER
YES
DISPLAY GRID GUIDE
DISPLAY PRIOR PAGE OF GRID GUIDE
WHAT'S ON TV KEY ?
NO
OTHER
YES
DISPLAY SINGLE CHANNEL GUIDE
WHAT'S ON TV KEY ?
NO
OTHER
YES

FIG.—8

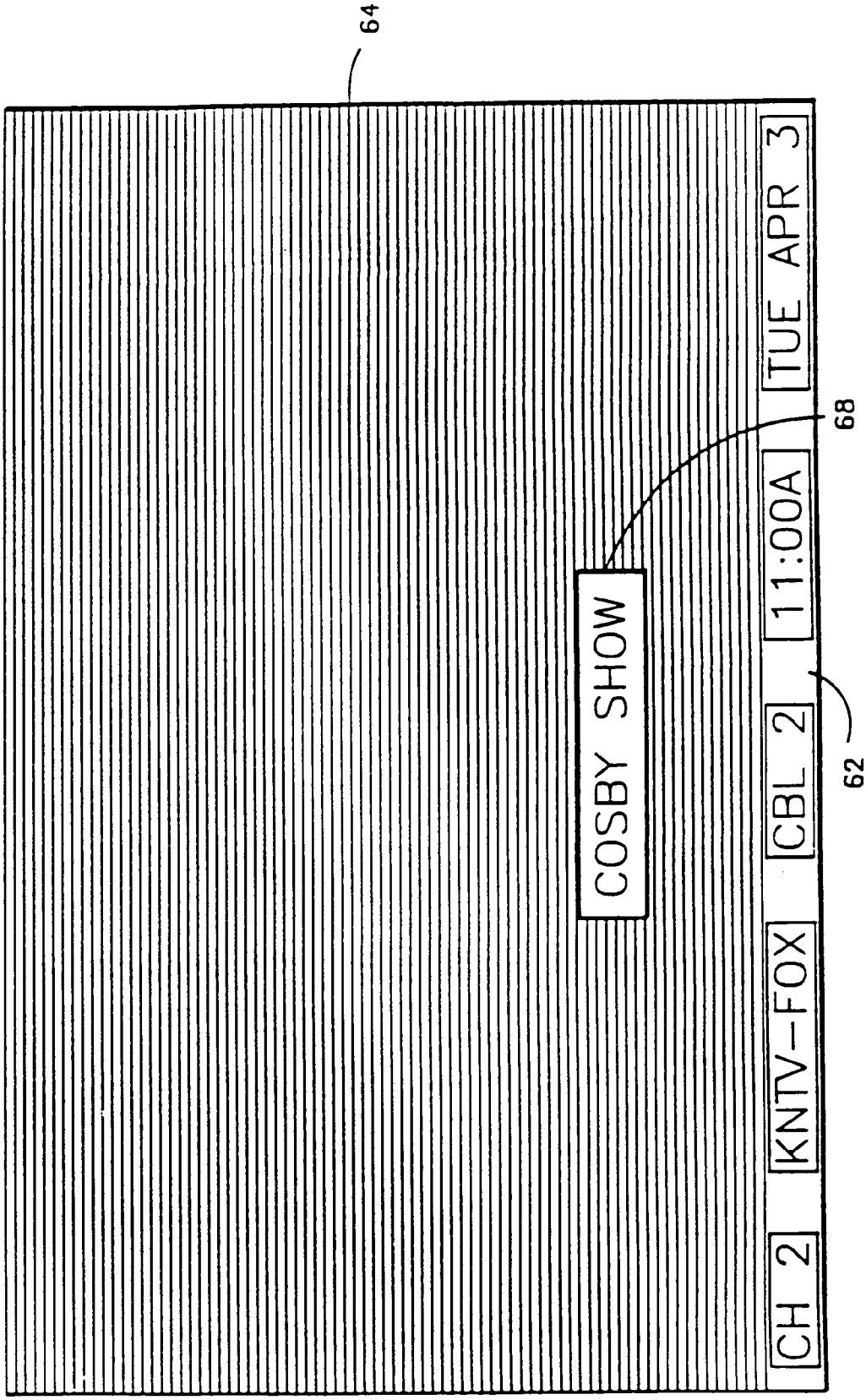

FIG. 9.

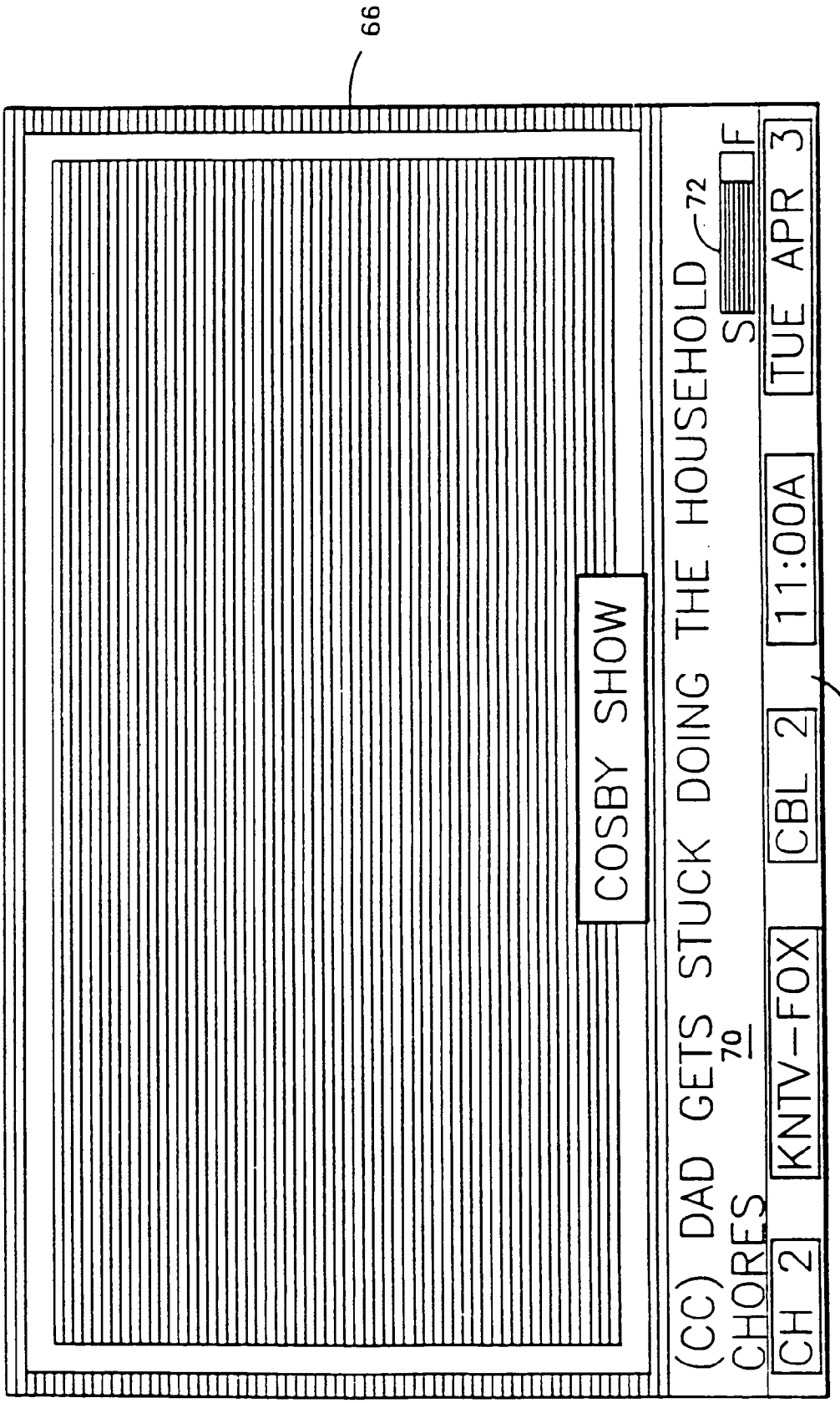
66
COSBY SHOW
(CC) DAD GETS STUCK DOING THE HOUSEHOLD CHORES
70
72
SF
CH 2
KNTV-FOX
CBL 2
11:00A
TUE APR 3
62

FIG. 10.

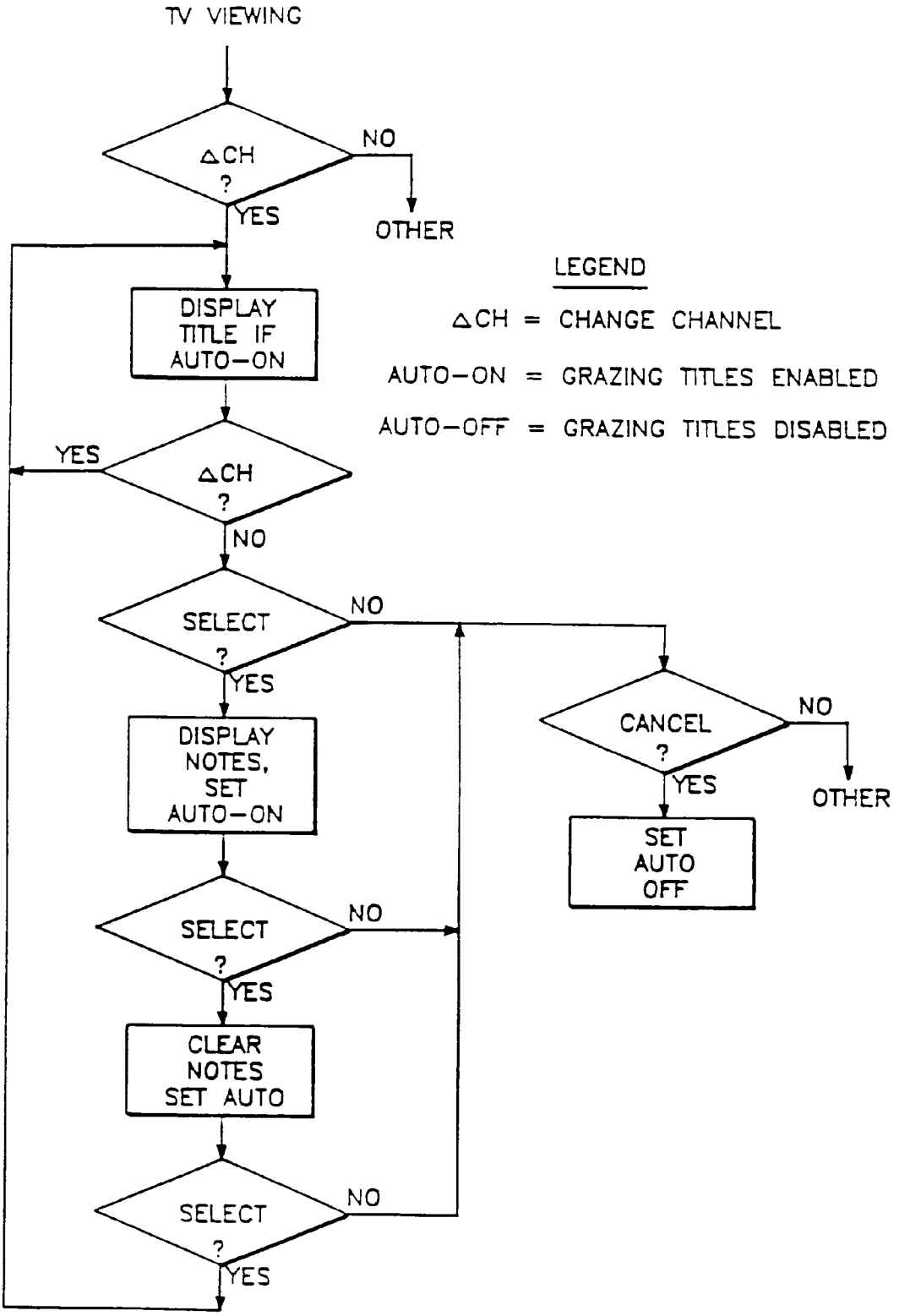
TV VIEWING
ΔCH ?
NO
OTHER
YES
DISPLAY TITLE IF AUTO-ON
ΔCH ?
YES
NO
SELECT ?
NO
YES
DISPLAY NOTES, SET AUTO-ON
CANCEL ?
NO
YES
OTHER
SET AUTO OFF
SELECT ?
NO
YES
CLEAR NOTES SET AUTO
SELECT ?
NO
YES
LEGEND
ΔCH = CHANGE CHANNEL
AUTO-ON = GRAZING TITLES ENABLED
AUTO-OFF = GRAZING TITLES DISABLED

FIG.-11

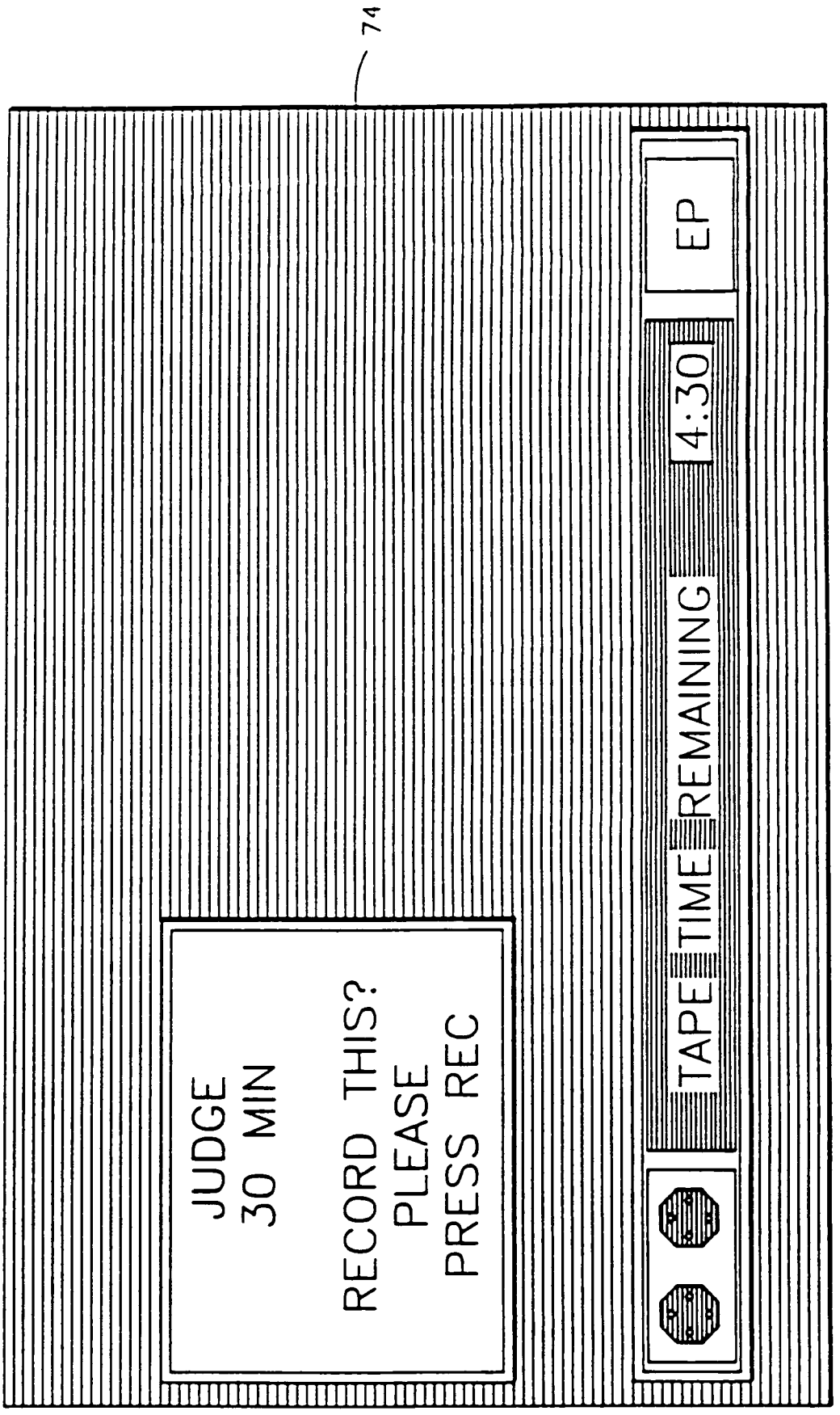
74
JUDGE
30 MIN
RECORD THIS?
PLEASE
PRESS REC
TAPE TIME REMAINING
4:30
EP

FIG. 12.

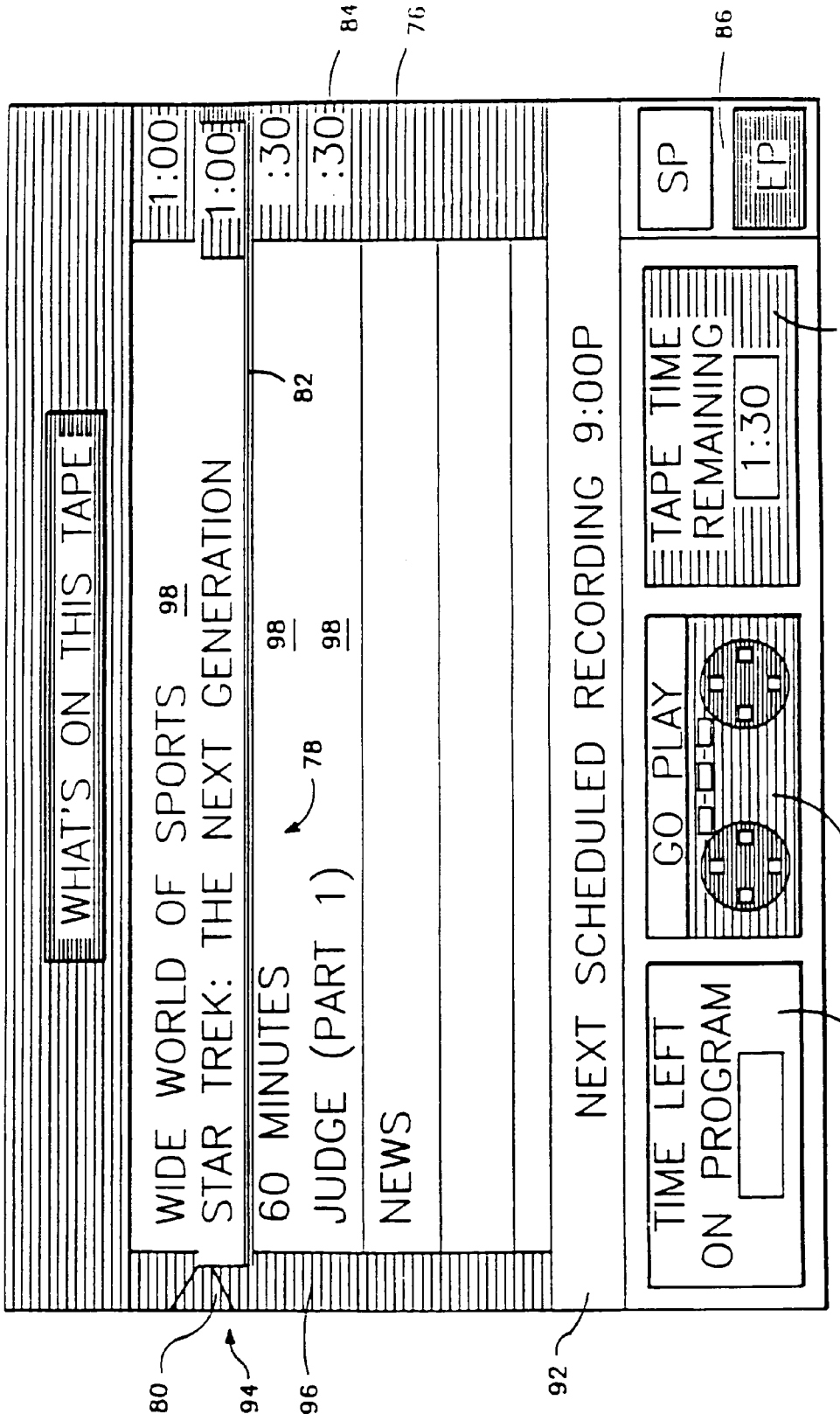
WHAT'S ON THIS TAPE
WIDE WORLD OF SPORTS
STAR TREK: THE NEXT GENERATION
60 MINUTES
JUDGE (PART 1)
NEWS
1:00
1:00
:30
:30
NEXT SCHEDULED RECORDING 9:00P
SP
EP
TAPE TIME REMAINING
1:30
GO PLAY
TIME LEFT ON PROGRAM
80
94
96
92
82
84
76
86
88
90
100
98
78

FIG. – 13

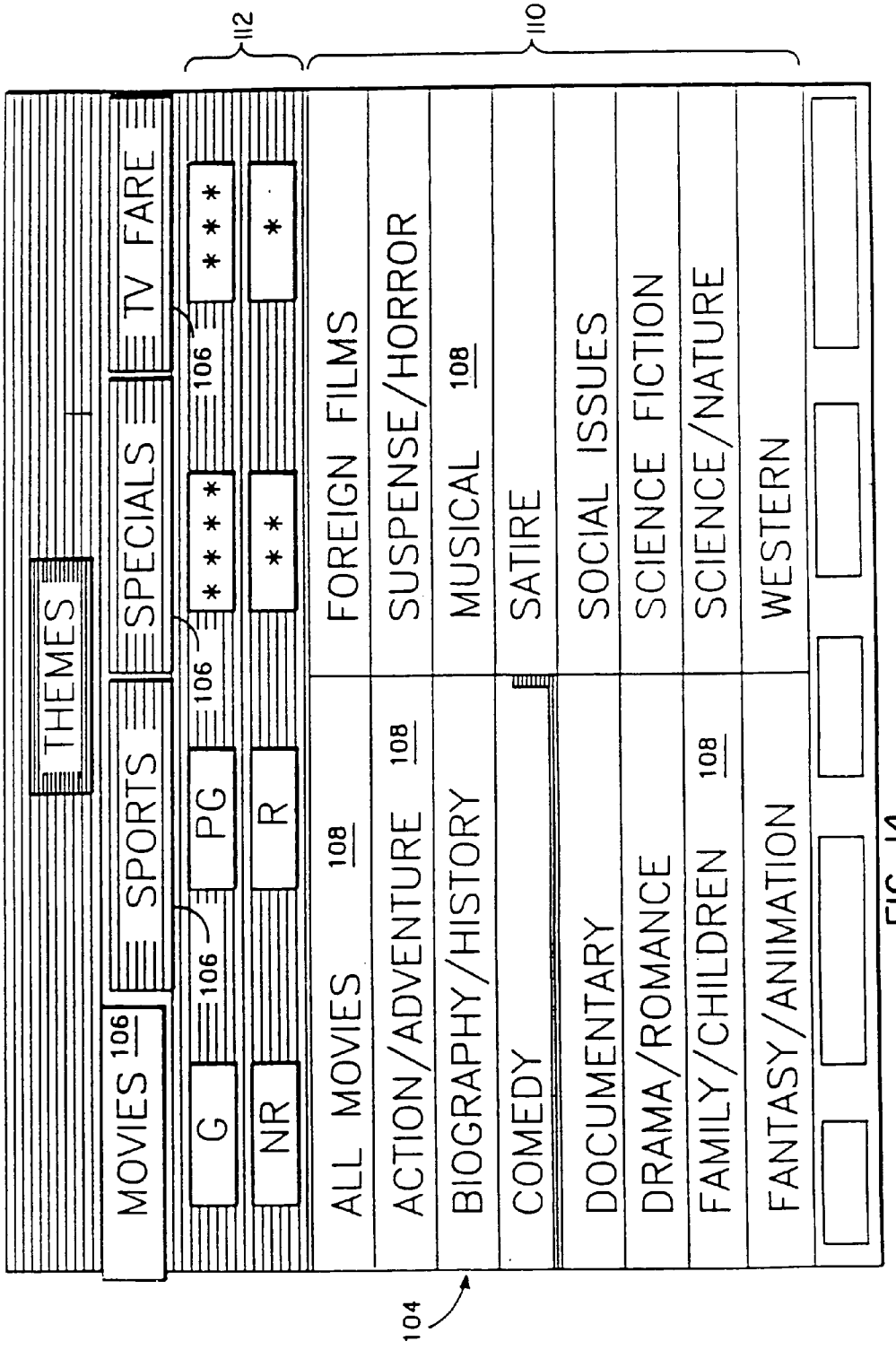
112
110
THEMES
MOVIES 106
SPORTS
SPECIALS
TV FARE
G
PG
NR
106
106
106
* * * *
* *
*
* * *
ALL MOVIES 108
ACTION/ADVENTURE 108
BIOGRAPHY/HISTORY
COMEDY
DOCUMENTARY
DRAMA/ROMANCE
FAMILY/CHILDREN 108
FANTASY/ANIMATION
FOREIGN FILMS
SUSPENSE/HORROR
MUSICAL 108
SATIRE
SOCIAL ISSUES
SCIENCE FICTION
SCIENCE/NATURE
WESTERN
104

FIG. 14.

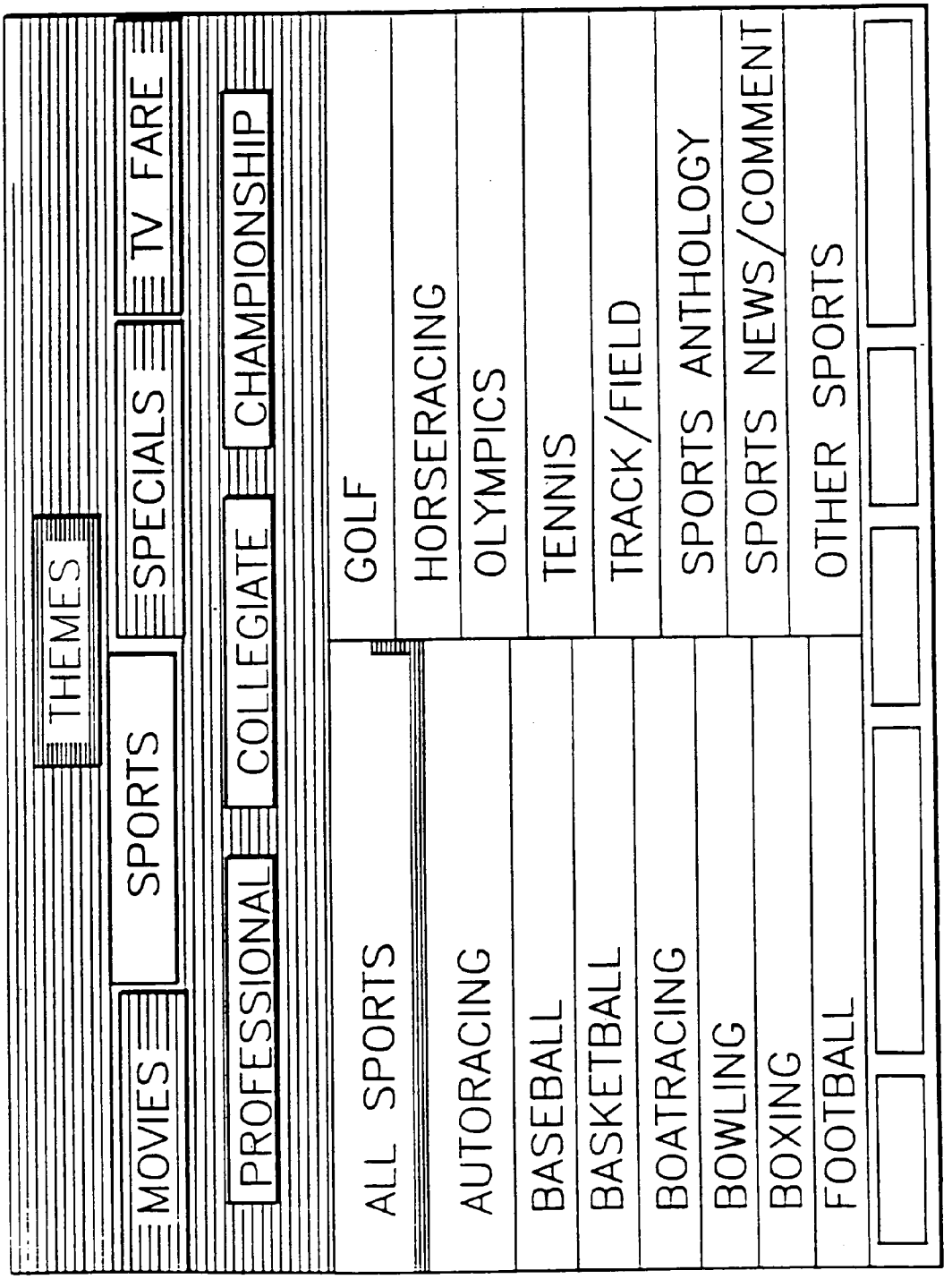
112
THEMES
MOVIES
SPORTS
SPECIALS
TV FARE
PROFESSIONAL
COLLEGIATE
CHAMPIONSHIP
ALL SPORTS
AUTORACING
BASEBALL
BASKETBALL
BOATRACING
BOWLING
BOXING
FOOTBALL
GOLF
HORSERACING
OLYMPICS
TENNIS
TRACK/FIELD
SPORTS ANTHOLOGY
SPORTS NEWS/COMMENT
OTHER SPORTS

FIG. 15.

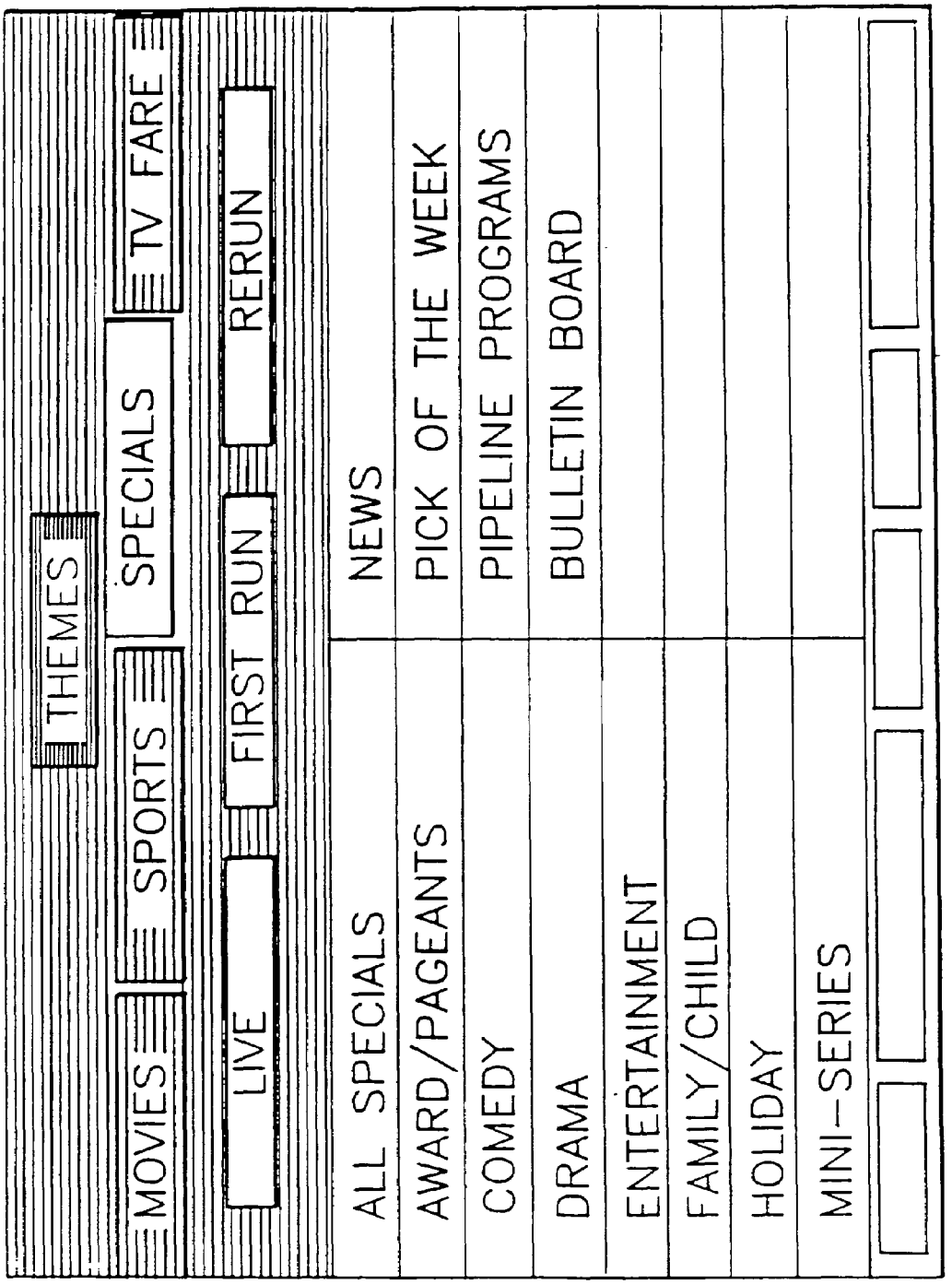
112
THEMES
SPECIALS
TV FARE
MOVIES
SPORTS
RERUN
LIVE
FIRST RUN
ALL SPECIALS
AWARD/PAGEANTS
COMEDY
DRAMA
ENTERTAINMENT
FAMILY/CHILD
HOLIDAY
MINI-SERIES
NEWS
PICK OF THE WEEK
PIPELINE PROGRAMS
BULLETIN BOARD

FIG. 16.

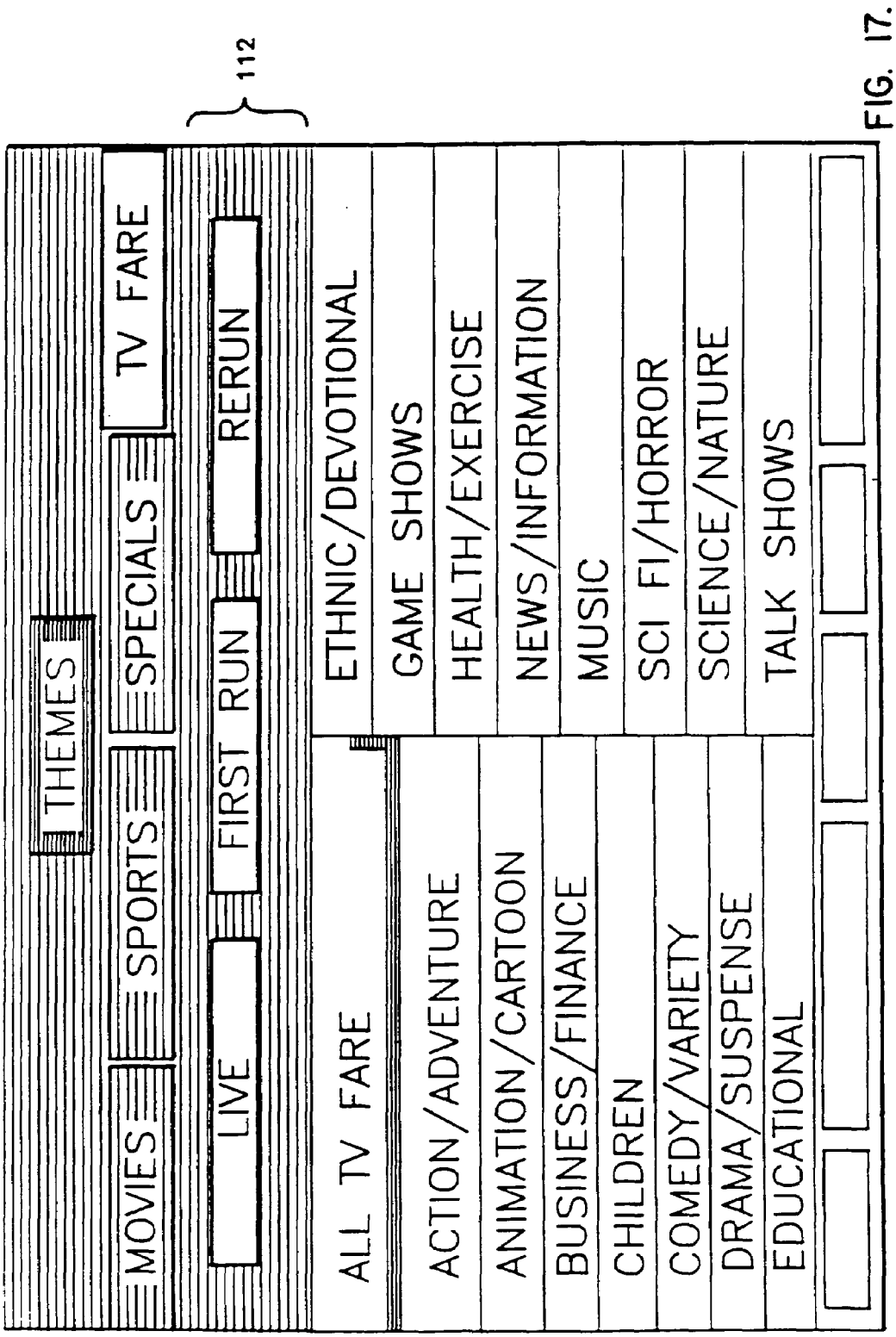
112
THEMES
MOVIES
SPORTS
SPECIALS
TV FARE
LIVE
FIRST RUN
RERUN
ALL TV FARE
ACTION/ADVENTURE
ANIMATION/CARTOON
BUSINESS/FINANCE
CHILDREN
COMEDY/VARIETY
DRAMA/SUSPENSE
EDUCATIONAL
ETHNIC/DEVOTIONAL
GAME SHOWS
HEALTH/EXERCISE
NEWS/INFORMATION
MUSIC
SCI FI/HORROR
SCIENCE/NATURE
TALK SHOWS

FIG. 17.

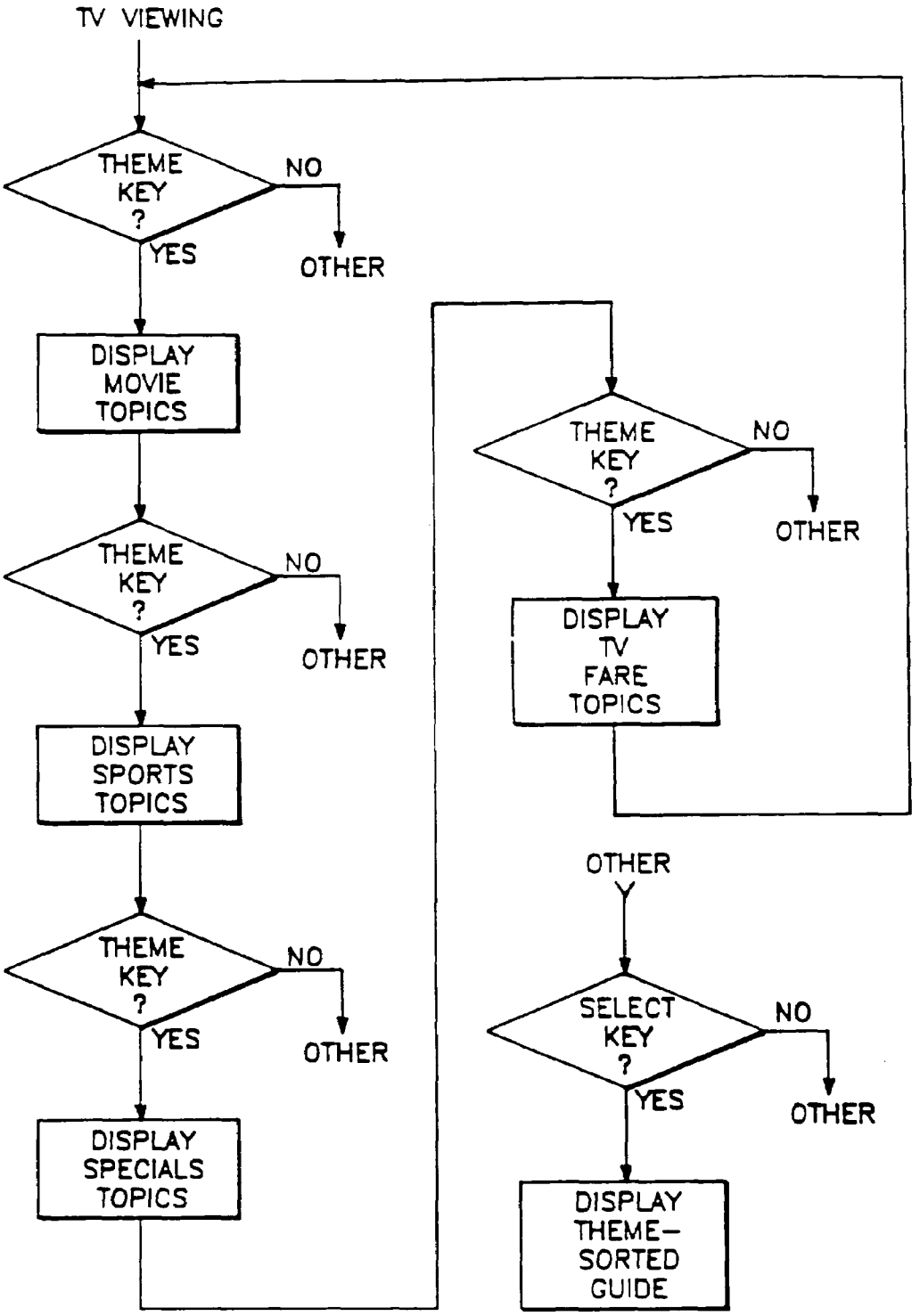
TV VIEWING
THEME KEY ?
NO
OTHER
YES
DISPLAY MOVIE TOPICS
THEME KEY ?
NO
OTHER
YES
DISPLAY SPORTS TOPICS
THEME KEY ?
NO
OTHER
YES
DISPLAY SPECIALS TOPICS
THEME KEY ?
NO
OTHER
YES
DISPLAY TV FARE TOPICS
OTHER
SELECT KEY ?
NO
OTHER
YES
DISPLAY THEME-SORTED GUIDE

FIG.-18

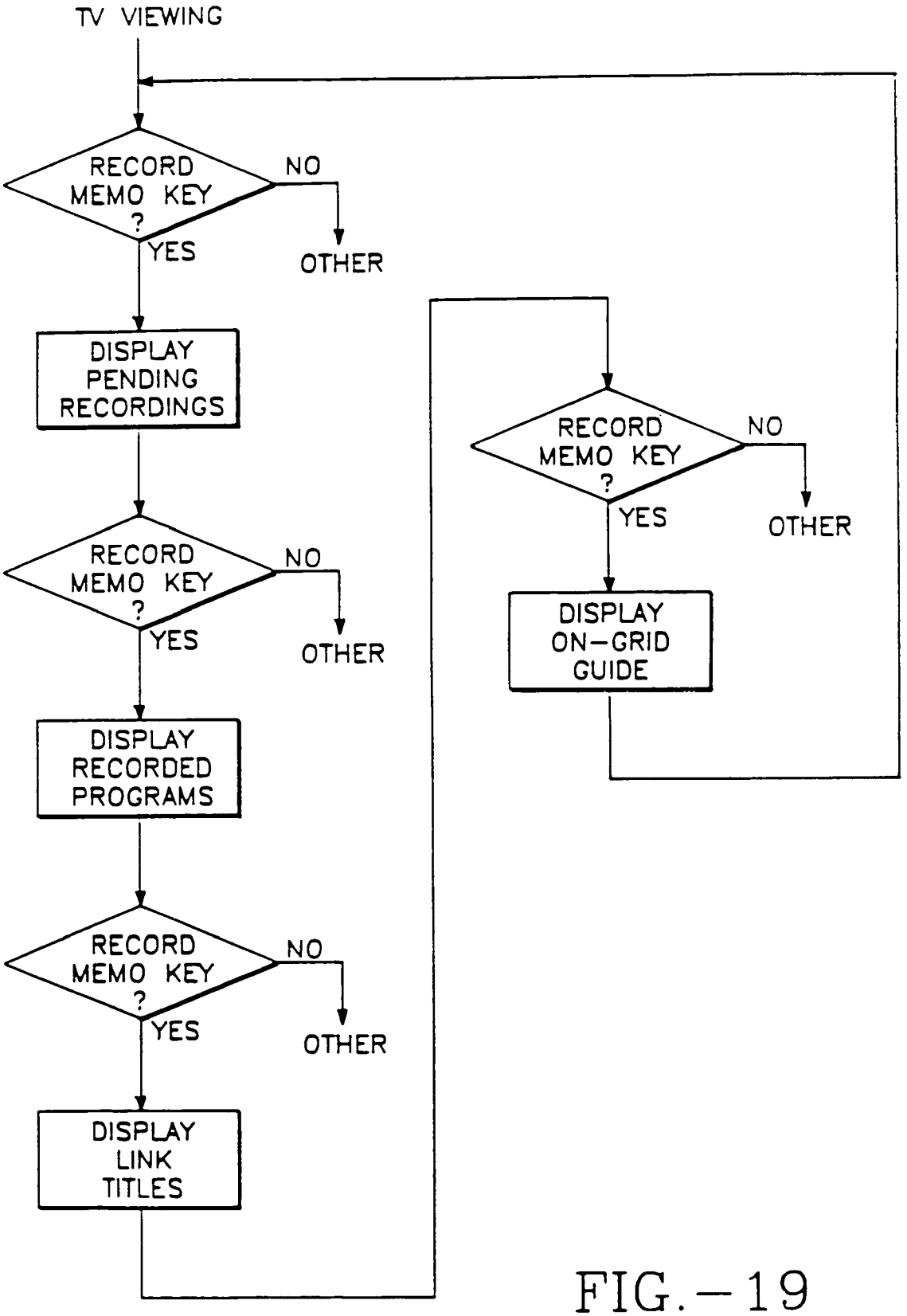
TV VIEWING
RECORD MEMO KEY ?
NO
OTHER
YES
DISPLAY PENDING RECORDINGS
RECORD MEMO KEY ?
NO
OTHER
YES
DISPLAY RECORDED PROGRAMS
RECORD MEMO KEY ?
NO
OTHER
YES
DISPLAY LINK TITLES
RECORD MEMO KEY ?
NO
OTHER
YES
DISPLAY ON-GRID GUIDE

FIG.-19

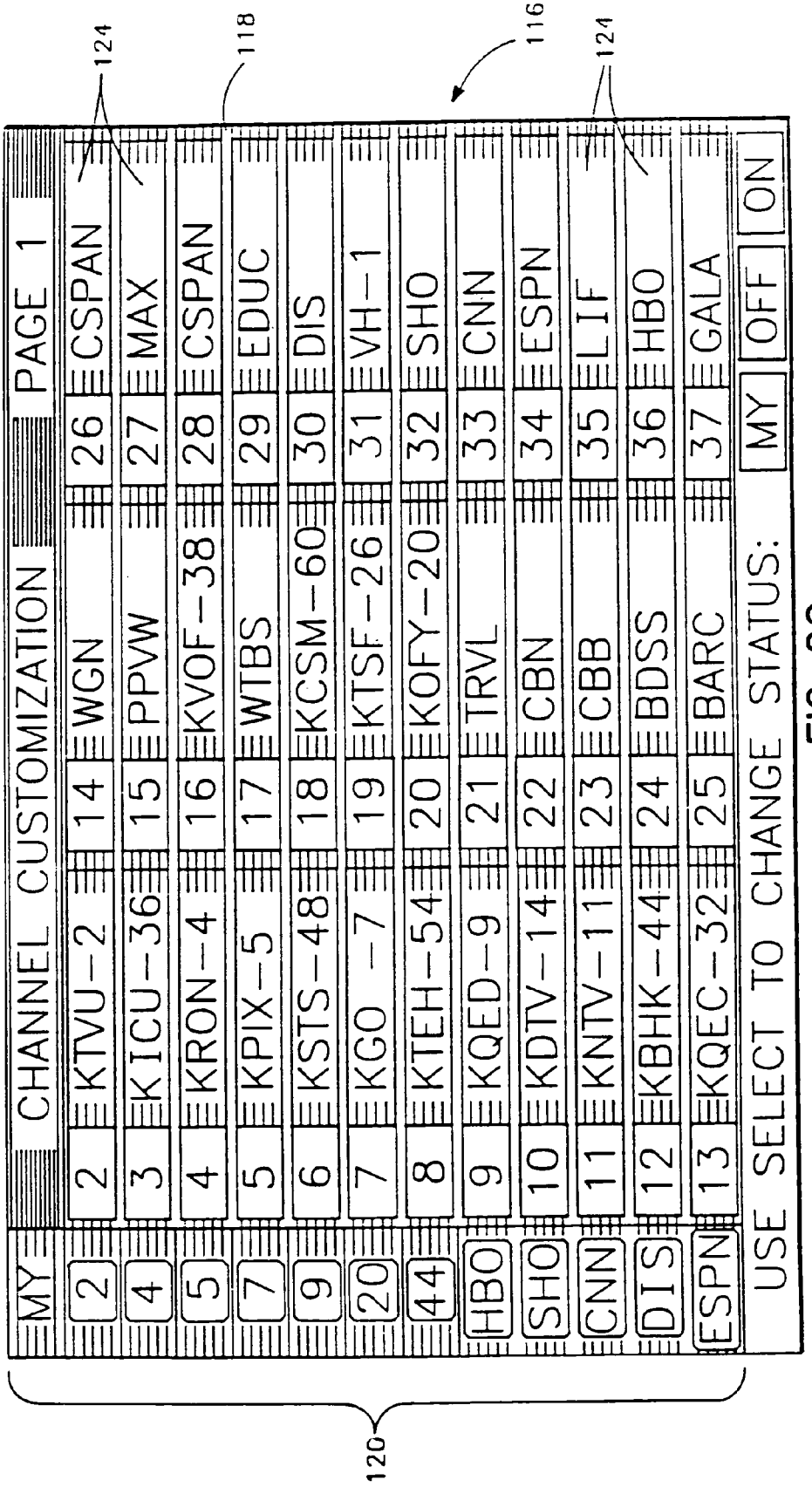
124
118
116
124
MY
CHANNEL CUSTOMIZATION
PAGE 1
2 KTVU-2 14 WGN 26 CSPAN
3 KICU-36 15 PPVW 27 MAX
4 KRON-4 16 KVOF-38 28 CSPAN
5 KPIX-5 17 WTBS 29 EDUC
6 KSTS-48 18 KCSM-60 30 DIS
7 KGO -7 19 KTSF-26 31 VH-1
8 KTEH-54 20 KOFY-20 32 SHO
9 KQED-9 21 TRVL 33 CNN
10 KDTV-14 22 CBN 34 ESPN
11 KNTV-11 23 CBB 35 LIF
12 KBHK-44 24 BDSS 36 HBO
13 KQEC-32 25 BARC 37 GALA
2
4
5
7
9
20
44
HBO
SHO
CNN
DIS
ESPN
USE SELECT TO CHANGE STATUS:
MY
OFF
ON
120

FIG. 20.

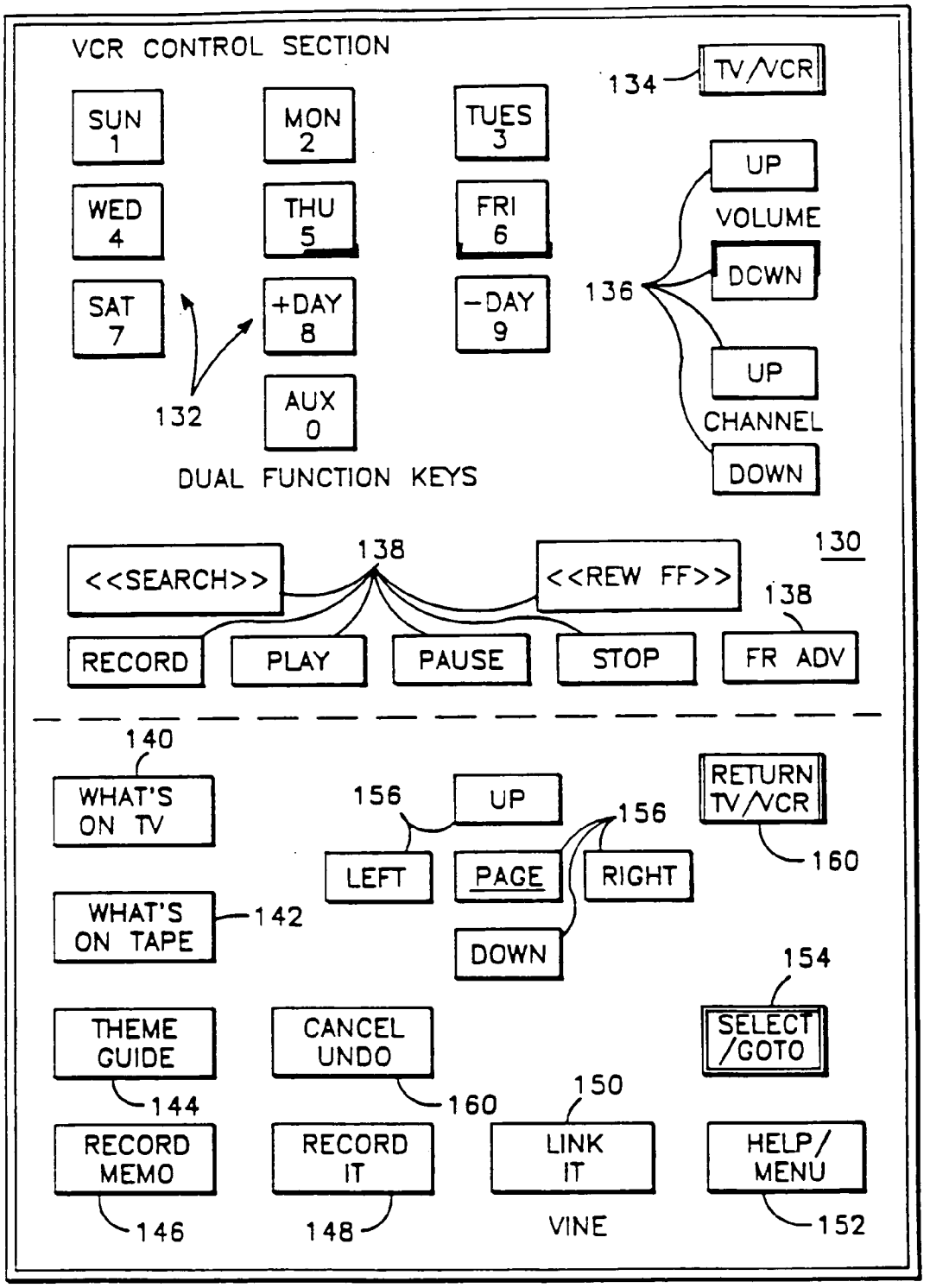
VCR CONTROL SECTION
134
TV/VCR
SUN 1
MON 2
TUES 3
WED 4
THU 5
FRI 6
SAT 7
+DAY 8
-DAY 9
AUX 0
132
DUAL FUNCTION KEYS
UP
VOLUME
DOWN
136
UP
CHANNEL
DOWN
130
138
<<SEARCH>>
<<REW FF>>
138
RECORD
PLAY
PAUSE
STOP
FR ADV
140
WHAT'S ON TV
156
UP
156
RETURN TV/VCR
160
LEFT
PAGE
RIGHT
DOWN
WHAT'S ON TAPE
142
154
THEME GUIDE
CANCEL UNDO
SELECT /GOTO
144
160
150
RECORD MEMO
RECORD IT
LINK IT
HELP/ MENU
146
148
VINE
152

FIG.-21

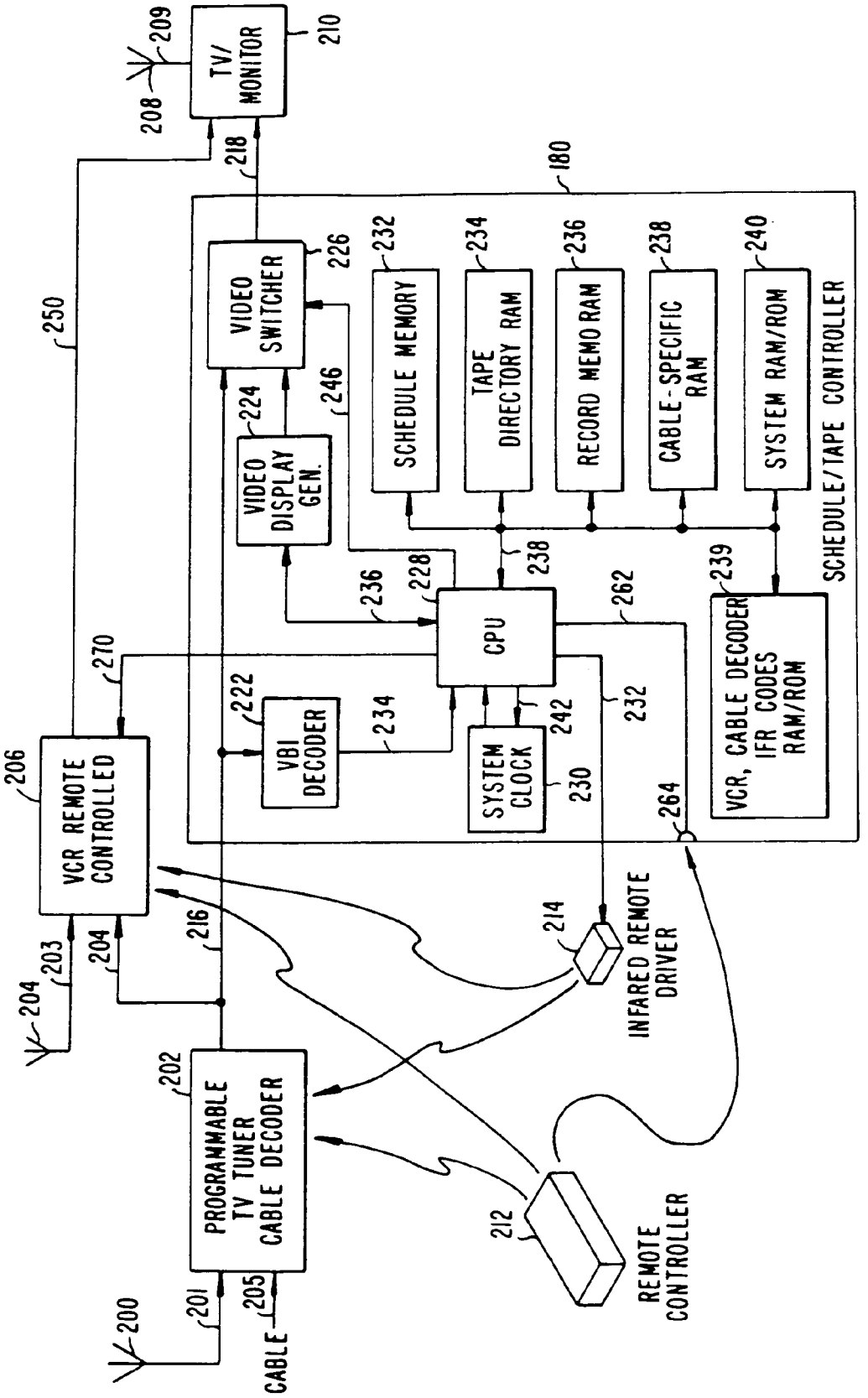
TV/ MONITOR
209
208
210
218
180
VIDEO SWITCHER
226
232
234
236
238
240
SCHEDULE MEMORY
TAPE DIRECTORY RAM
RECORD MEMO RAM
CABLE-SPECIFIC RAM
SYSTEM RAM/ROM
SCHEDULE/TAPE CONTROLLER
250
224
246
VIDEO DISPLAY GEN.
236
228
238
CPU
262
239
VCR, CABLE DECODER IFR CODES RAM/ROM
270
222
VBI DECODER
234
SYSTEM CLOCK
242
230
232
264
206
VCR REMOTE CONTROLLED
203
204
216
214
INFARED REMOTE DRIVER
202
PROGRAMMABLE TV TUNER CABLE DECODER
212
REMOTE CONTROLLER
201
205
200
CABLE

FIG. 22A.

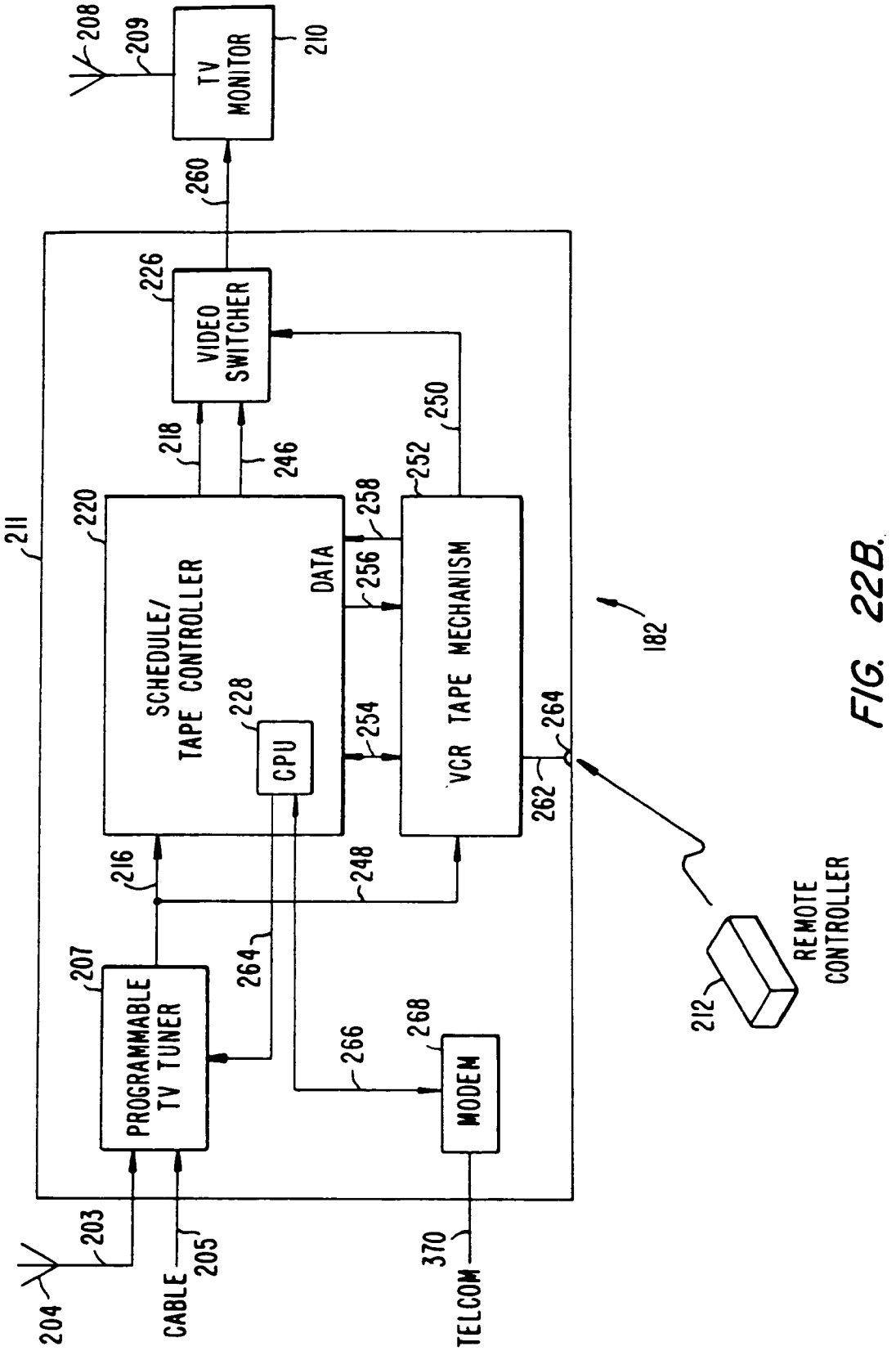
208
209
TV MONITOR
210
260
226
VIDEO SWITCHER
218
246
250
252
258
256
220
SCHEDULE/ TAPE CONTROLLER
DATA
228
CPU
254
VCR TAPE MECHANISM
264
262
182
211
216
248
207
PROGRAMMABLE TV TUNER
264
266
268
MODEM
REMOTE CONTROLLER
212
203
205
370
204
CABLE
TELCOM

FIG. 22B.

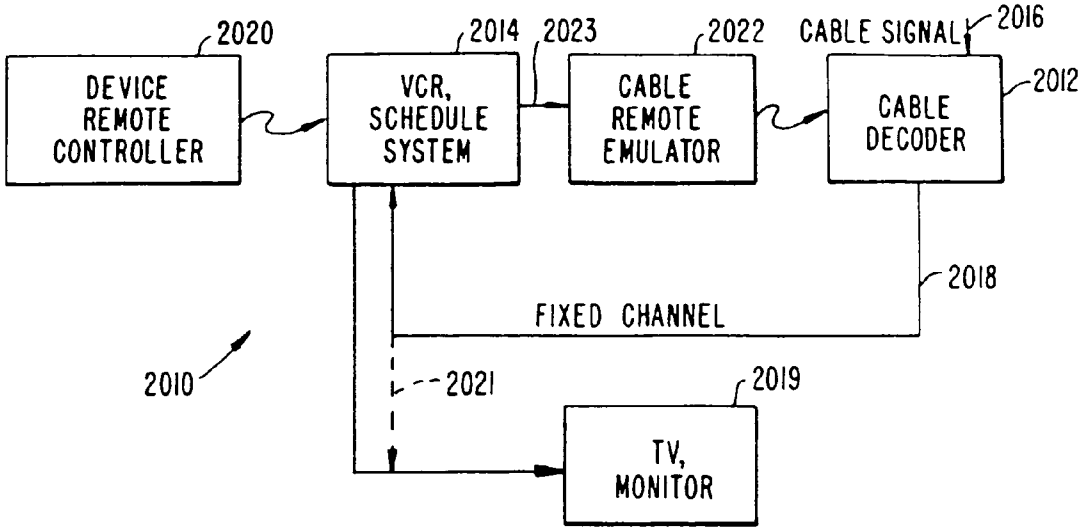
2020
DEVICE REMOTE CONTROLLER
2014
VCR, SCHEDULE SYSTEM
2023
2022
CABLE REMOTE EMULATOR
CABLE SIGNAL
2016
CABLE DECODER
2012
2018
FIXED CHANNEL
2010
2021
2019
TV, MONITOR

FIG. 23.

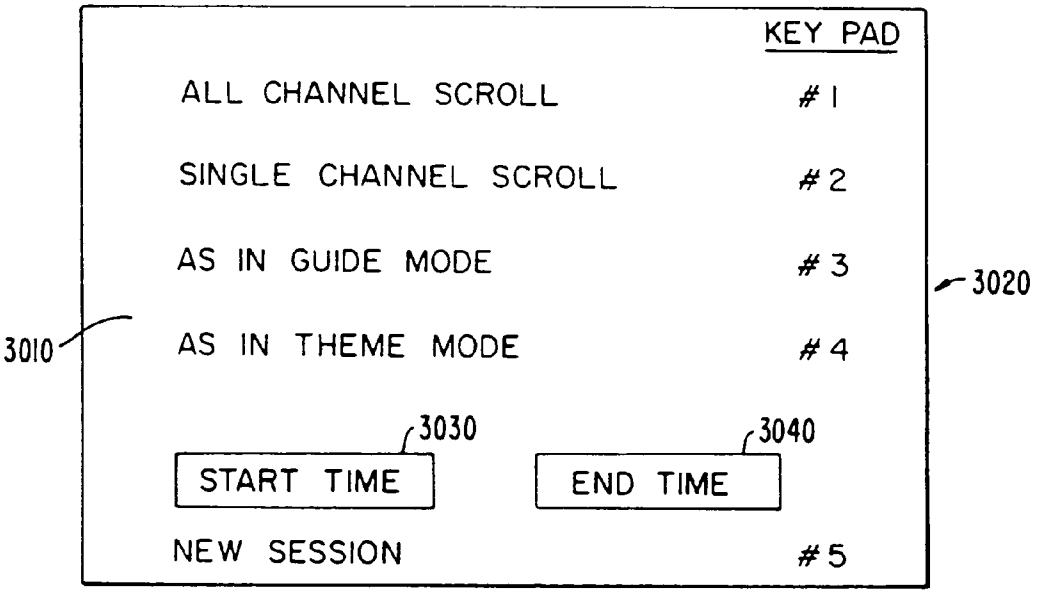
KEY PAD
ALL CHANNEL SCROLL #1
SINGLE CHANNEL SCROLL #2
AS IN GUIDE MODE #3
AS IN THEME MODE #4
3010
3020
3030
3040
START TIME
END TIME
NEW SESSION #5

FIG. 25.

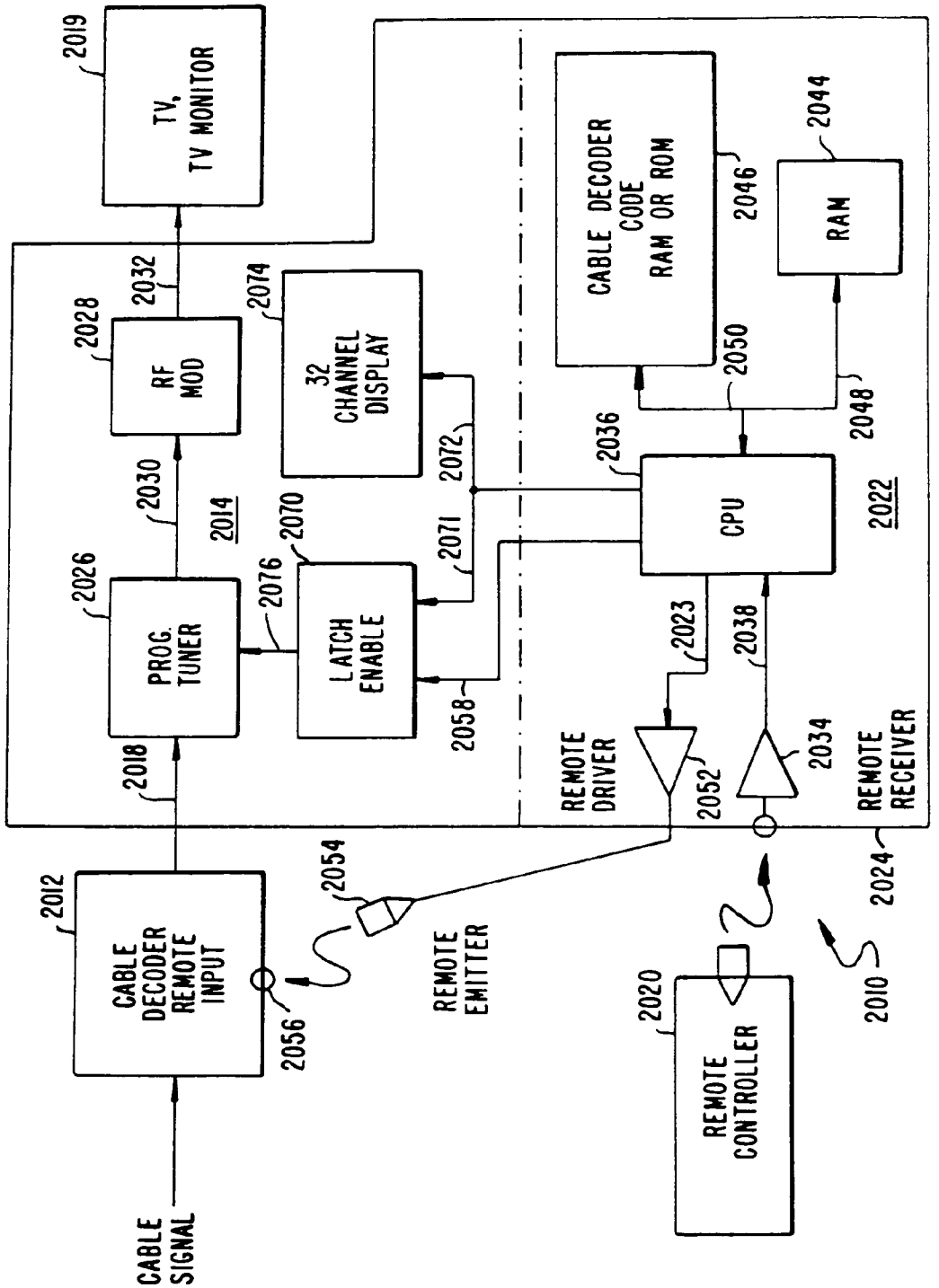
2019
TV, TV MONITOR
2032
2028
RF MOD
2074
32 CHANNEL DISPLAY
CABLE DECODER CODE RAM OR ROM
2046
2044
RAM
2050
2048
2030
2014
2072
2036
2026
PROG. TUNER
2070
2076
LATCH ENABLE
2071
CPU
2022
2023
2038
2058
REMOTE DRIVER
2052
2034
REMOTE RECEIVER
2018
2012
CABLE DECODER REMOTE INPUT
2054
2056
REMOTE EMITTER
2024
2020
REMOTE CONTROLLER
2010
CABLE SIGNAL

FIG. 24.

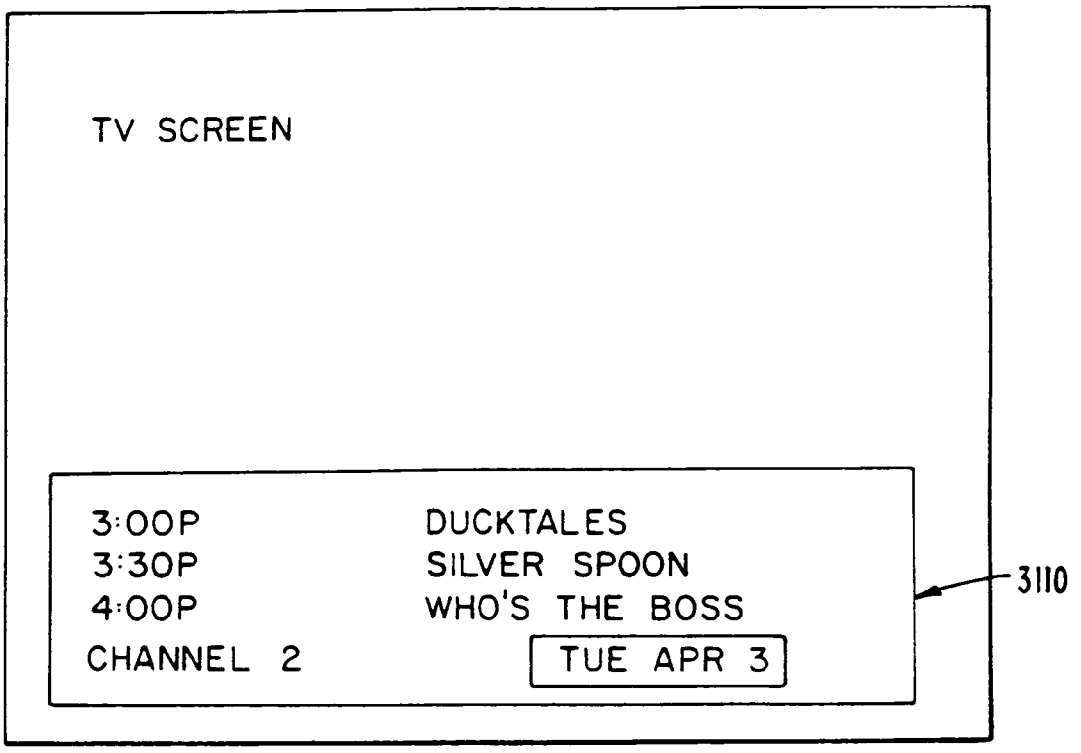

FIG. 26A.

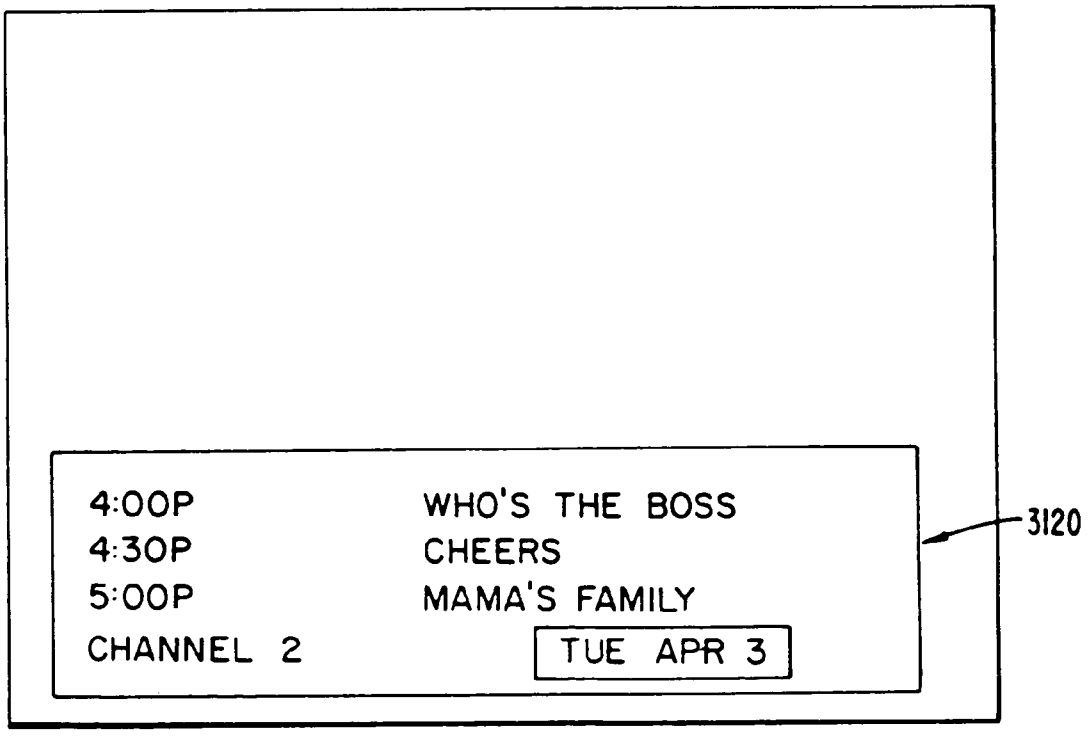

FIG. 26B.

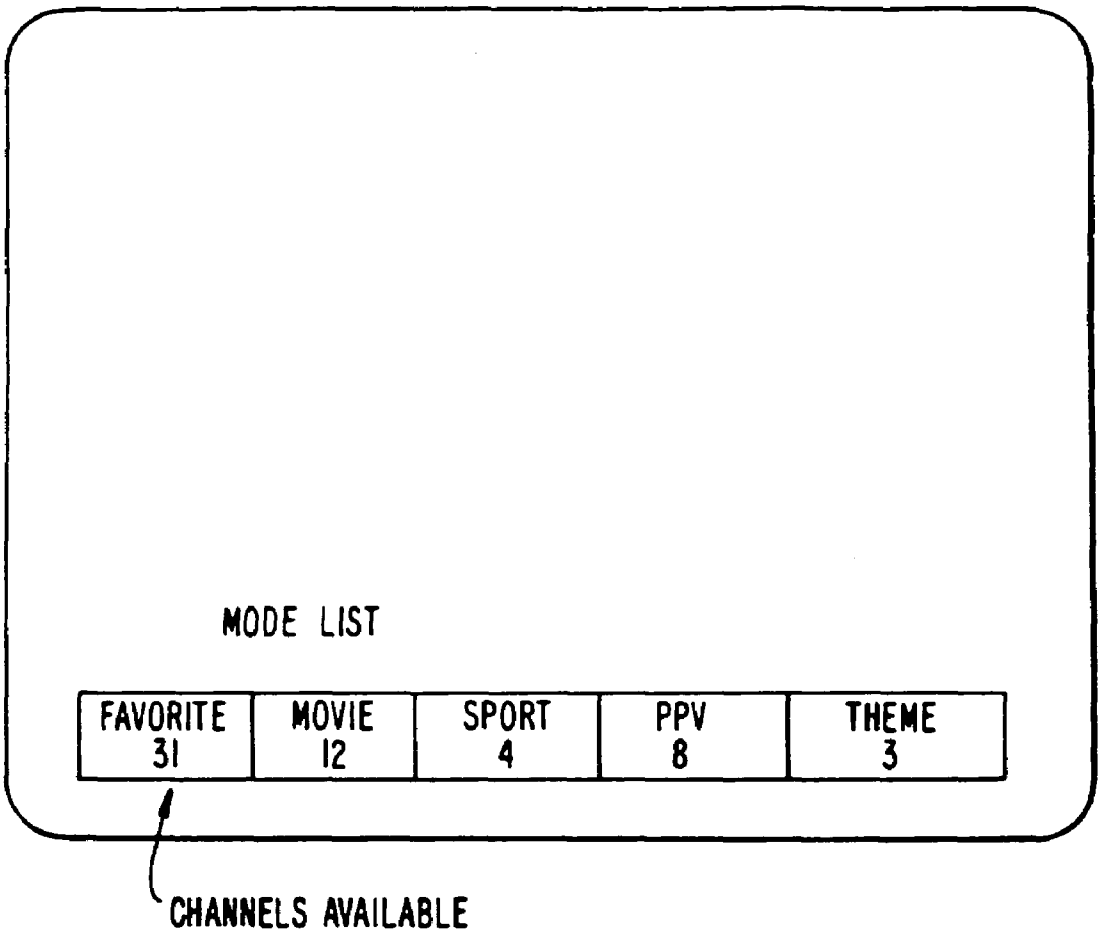
MODE LIST
FAVORITE
31
MOVIE
12
SPORT
4
PPV
8
THEME
3
CHANNELS AVAILABLE

FIG. 27.

KEY	GRAZING TITLES POP UP FOR CURRENT CHANNEL	GRAZING TITLES POP UP FOR OTHER THAN CURRENT CHANNEL
INFO	DISPLAY GRAZING INFO POP UP FOR THE PROGRAM ON THE CURRENTLY TUNED CHANNEL.	DISPLAY GRAZING INFO POP UP FOR THE PROGRAM WHOSE GRAZING TITLES POP UP IS CURRENTLY DISPLAYED.
TUNE	DISPLAY "?" POP UP.	TUNE TO THE CHANNEL AIRING THE PROGRAM WHOSE GRAZING TITLES POP UP IS CURRENTLY DISPLAYED AND DISPLAY GRAZING TITLES POP UP.
RECORD	DISPLAY RECORD CONFIRMATION POP UP FOR THE PROGRAM ON THE CURRENTLY TUNED CHANNEL.	DISPLAY RECORD CONFIRMATION POP UP FOR THE PROGRAM WHOSE GRAZING TITLES POP UP IS CURRENTLY DISPLAYED.

FIG. 28A.

IF A GRAZING INFO POP UP IS OPEN:

KEY	ACTION
UP/DOWN	LEAVE GRAZING INFO POP UP OPEN.
INFO	REMOVE GRAZING INFO POP UP.
TUNE	TUNE TO THE CHANNEL DISPLAYED IN THE CURRENT GRAZING INFO POP UP, CLOSE THE POP UP, AND DISPLAY THE GRAZING TITLES POP UP. THIS FUNCTIONALITY IS CONSISTENT WITH TUNING FROM A GUIDE OR WITH THE NUMBER PAD.
RECORD	REMOVE GRAZING INFO POP UP, DISPLAY RECORD CONFIRMATION POP UP. THIS FUNCTIONALITY IS CONSISTENT WITH STARTING A RECORDING FROM TV STATE.

FIG. 28B.

ARRANGING CHANNEL INDICATORS IN A TELEVISION SCHEDULE SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

This is a continuation of U.S. patent application Ser. No. 09/132,479, filed Aug. 11, 1998, which is a continuation-in-part of U.S. patent application Ser. No. 08/033,773, filed Mar. 19, 1993, now U.S. Pat. No. 5,353,121, which is a continuation-in-part both of U.S. patent application Ser. No. 07/579,555, filed Sep. 10, 1990, now abandoned, and of U.S. patent application Ser. No. 07/916,043, filed Jul. 17, 1992, now abandoned and which is a continuation of U.S. patent application Ser. No. 07/778,404, filed Oct. 17, 1991, now U.S. Pat. No. 5,151,789, which is a continuation-in-part of U.S. patent application Ser. No. 07/428,620, filed Oct. 30, 1989, now abandoned all of which are herein incorporated by reference in their entireties.

BACKGROUND OF THE INVENTION

One aspect of the present invention relates generally to a system and process that allows a television viewer to access on screen television program listings and use the program listings in an easy and convenient way to control operation of a video cassette recorder (VCR) or other recording device. In particular, it relates to a system and process that displays on a television screen, overlaying a primary television display or program, a small background schedule guide that can be easily accessed by a user during lulls in the primary television display or program.

Another aspect of the present invention relates to such a system and process that creates a directory of recorded programs by title for easy retrieval and program playback. More particularly, it relates to such a system and process in which the VCR or other recording device is controlled by a simple selection of program title and a record command, even for recording at a future date and time. Most especially, it relates to such a system and process incorporating an intuitive user interface.

Yet another aspect of the present invention relates generally to a cable television (CATV) decoder interface. More particularly, it relates to such an interface for connecting the cable television decoder to a television accessory, such as a video cassette recorder (VCR). Most especially, it relates to such an interface which maintains full functionality of the television accessory while connected to the decoder.

The difficulty of setting a VCR for automatic recording at a future date is notorious. Even users who are technically sophisticated will often make mistakes in the VCR programming procedure that cause them to record the wrong program or not to record anything at all. This difficulty has even resulted in a substantial body of humor dedicated to the subject of programming VCRs.

The difficulty of VCR programming has been alleviated somewhat by the development of VCRs that use a television set as a display for user prompts and feedback to the user during the programming process. U.S. Pat. No. 4,908,713, issued Mar. 13, 1990 to Michael R. Levine, discloses such a VCR using the television set as a display for VCR programming with an interactive user interface for directing the user on a step-by-step basis. Such a user interface removes a great deal of the mystery from VCR programming, but users still have difficulty with such a command-based interface and encounter problems carrying out the programming without

making mistakes that cause them to miss recording programs they would like to watch at a different time than when they are broadcast.

Commonly assigned U.S. Pat. No. 4,706,121, issued Nov. 10, 1987 to Patrick Young, discloses a system and process in which user selections from television schedule information are used for automatic control of a VCR. That patent also contains a description of a proposed user interface for such a system and process. However, the provision of a highly intuitive user interface that makes such a system and process easy and convenient to operate is a difficult task. Further development of this system and process has produced considerable change in the user interface as originally proposed.

In addition to simplifying VCR programming, users who do a substantial amount of program taping also need an improved system and process for keeping track of their recorded programs. Commonly assigned application Ser. No. 07/219,971, filed Jul. 15, 1988, in the name of Patrick Young, discloses a system and process that provides indexing capability for taped material. A user interface for a television schedule system and process should also handle this capability on an intuitive basis.

Thus, while the art pertaining to the control of VCRs and to television schedule systems is a well-developed one, a need still remains for a television schedule system and process incorporating an improved user interface. In particular, unlike most computer menus, a grid TV guide is an array of irregular cells, where the cell size can vary from a fraction of an hour to many hours—extending well beyond the current screen. If this array is navigated by a cursor that goes from cell to cell, a single cursor command can produce violent screen changes. For example, a cursor right command may cause an abrupt jump to a cell situated several hours from the current page. Not only is this unsettling, but may take considerable effort to recover. Clearly, a gentler cursor motion is needed for the irregular cells found in a grid TV guide.

Printed grid television schedule guides often include additional information besides the program title and broadcast names. Such grids are also typically provided in combination with a more detailed printed schedule that contains a synopsis of each program, whether the program is a repeat, ratings for movies, and other information. When using a television set as a display for a schedule system, the size and resolution of the television display limit the amount of text that can be displayed with the grid. Improved techniques are required for conveying the most amount of information to the user in an easily understood manner within the limitations of the television display. When a large number of channels are available for viewing, there is also a need to order the display of information most conveniently for the user.

Programming a VCR for unattended recording becomes even more problematic when it is desired to record cable programs. Cable television decoders typically operate by requiring a television set and a VCR connected to the decoder to be set to a predetermined channel, such as channel 2, 3 or 4, and all channel selection is accomplished by the decoder. This presents problems for unattended recording, in that not all of the advanced features available on state-of-the-art VCRs can bee used while the VCR is under control of the decoder.

Two Zenith Electronics Corporation technical papers disclose systems which attempt to deal with this problem. Merrell, "Tac-Timer," 1986 NCTA Technical Papers, pp. 203-206, discloses a smart remote controller to solve the unattended programming problem when a cable decoder precedes a VCR. The smart controller is programmed to turn on the cable decoder at specific times, but the VCR must be

programmed independently to match the programming of the smart controller. However, this remote controller does not coordinate channel selection for such devices as television schedule systems, such as disclosed in my U.S. Pat. No. 4,706,121, issued Nov. 10, 1987, nor does it support unique features of more advanced VCRs. For example, this controller does not support on-screen VCR programming, even if that feature is otherwise available on a VCR. The controller does not include any capability for conveying information about a channel selected on the cable decoder unit to a television schedule system or a VCR in any useful way.

Long, "The VCR Interface," 1986 NCTA Technical Papers, pp. 197-202, discloses two solutions for the unattended programming problem when a cable decoder precedes a VCR. The first of these is a VCR baseband decoder, also called BASE-TAC, and currently marketed by Zenith as MultiPort or MP. MPs allow the core functions (descrambling and addressing) of a cable decoder to be added to TVs and VCRs. The decoder accepts the baseband output of the TV or VCR tuner, eliminating the need for a separate decoder tuner and attendant need to coordinate two tuners. This method is effective for supporting television schedule systems and allows full functionality of advanced VCR features. However, the MP alternative requires new TV or VCR equipment and is not compatible with the existing installed base of cable decoders. This method has not been well-received at this time. The second is the VCR Interface, which uses RF switching and a centralized approach for all TVs and VCRs in the home. It descrambles incoming CATV channels and, after modulation, combines them back onto the CATV cable at unused upper channels. The result is that any TV set on the cable can receive premium channels without a separate decoder. This method eliminates the need for redundant decoders at ever. TV set or VCR. As described, the system was conceived for only one premium channel. To support a television schedule system, all premium channels must be descrambled together and be available simultaneously. If not, it would be necessary to provide a way of tuning the centralized descrambler from any TV set or VCR attached to the cable. Such a scheme would be awkward when more than one TV or VCR competes for control of the single descrambler. The VCR interface may be implemented using retrofitted decoders, but the overall cost may be prohibitive for the average home.

A somewhat similar system for use with the German television networks is described in Sommerhauser, "Video Programm System: Flexibel programmieren mit VPS," Funkschau, No. 25, Dec. 1985, pp. 47-51.

Other prior art relating to CATV, its decoders, and programmable remote devices includes west German Published Application 2,338,380, published Feb. 13, 1975; U.K. Patent 1,554,411, published Oct. 17, 1979; U.S. Pat. No. 4,375,651, issued Mar. 1, 1983 to Templin et al.; U.S. Pat. No. 4,394,691, issued Jul. 19, 1983 to Amano et al; U.S. Pat. No. 4,802,114, issued Jan. 31, 1989 to Sogame. While the prior art relating to cable decoder interfaces and similar devices is a well-developed one, a need remains for further development of such devices. None of the existing interfaces both provides a complete solution to the problem of unattended recording and is compatible with already installed equipment.

SUMMARY OF THE INVENTION

The above problems and difficulties present in the prior art are overcome through the use of the novel system and method of the present invention. One aspect of the present invention is directed to a system and method to allow automatic, unattended recording of cable television programs supplied on a cable system as herein disclosed. A video recording system to allow automatic, unattended recording of at least two cable television programs supplied sequentially at different times on different channels of a cable system includes a television receiver, a remote controllable cable decoder and a remote controllable video recorder with unattended programming capability connected between the television receiver and the cable decoder. A remote controller for the video recorder includes a means for user input of program selections from a television schedule. The remote controller is coupled to the video recorder. A channel selection coordinator includes a memory means for storing channel tuning conversion information and program selections input by the user with the means for user input of program selections. A means converts channels of the at least two program selections to channel tuning commands recognizable by the cable decoder using the channel tuning conversion information and the program selections. A means automatically transmits the channel tuning commands to the cable decoder at desired activation times of the at least two program selections (typically the broadcast times, with a guard time at the beginning and end of each program). A means automatically supplies recording commands to the video recorder at the desired activation times of the at least two program selections.

The method of this aspect of the invention automatically records cable television programs supplied sequentially at different times on a cable system unattended, even with channel changes between the programs. A remote controllable video recorder having unattended programming capability is connected between a television receiver and a remote controllable cable decoder. Channel tuning conversion information is stored in a memory. Program selections for at least two programs on different channels is input from a television schedule with a remote controller for the video recorder. The program selections are stored in the memory. Channels of the program selections are converted to channel tuning commands recognizable by the cable decoder using the channel tuning conversion information and the program selections. The channel tuning commands are automatically transmitted to the cable decoder at broadcast tines of the program selections. Recording commands are automatically transmitted to the video recorder at the broadcast times of the program selections.

Another aspect of the present invention is directed to a novel television schedule system and process user interface herein disclosed. A television schedule system including a user interface in accordance with this aspect of the invention has a display and a means connected to the display for displaying the television schedule on the display as an array of irregular cells which vary dimensionally in length, corresponding to different television program time lengths. A means is connected to the display for providing a cursor with the television schedule on the display. The cursor has a variable length corresponding to the length of a selected one of the irregular cells in which the cursor is located. A means is connected to the means for providing the cursor for moving the cursor in the array in a series of equal length steps. At least some of the irregular cells have a length which is greater than the length of the steps.

In the process of operating a television schedule system with the user interface of this aspect of the invention, the television schedule is displayed as an array of irregular cells which vary dimensionally in length, corresponding to different television program time lengths. A cursor is provided with the television schedule on the display, the cursor has a variable length corresponding to the length of a selected one of the irregular cells in which the cursor is located. The cursor is

moved in the array in a series of equal length steps, with at least some of the irregular cells having a length which is greater than the length of the steps.

In another aspect of the invention, a control system for a video recording machine has a controller for starting and stopping the video recording machine, for recording video information on recording media, and for playing recorded video information on recording media. A display generator provides display image generation signals. A means supplies information to the display generator for generation of display images relating to operation of the video recording machine. The means for supplying information includes means for generating a recording media position indicator graduated as segments corresponding to programs recorded on the recording media.

In a process for controlling a video recording machine according to this aspect of the invention, a recording media position indicator is graduated as segments corresponding to programs recorded on the recording media. The recording media position indicator is displayed as position of a selected one of the recording media in the video recording machine is changed.

In a further aspect of the invention, a television schedule system includes a display and means connected to the display for displaying the television schedule on the display. The means for displaying a schedule is configured to allow selection by a user of a first number of desired channels for display of schedule information which is less than a second number of available channels. A programmable tuner is connected to the means for displaying a schedule. The programmable tuner is configured to follow the first number of desired channels when the television schedule is shown on the display in response to a channel up or channel down command. The programmable tuner is configured to follow the second number of available channels in the absence of the television schedule on the display in response to a channel up or channel down command.

In a process or operating a television schedule system according to this further aspect of the invention, a first number of desired channels is selected for display of schedule information, which is less than a second number of available channels. The schedule information is displayed on a display. The first number of desired channels is followed when the schedule information is shown on the display in response to a channel up or channel down command. The second number of available channels is followed in the absence of the television schedule on the display in response to a channel up or channel down command.

According to yet another aspect of the present invention, user control of a television is simplified by a system and process that displays on a television screen, overlaying a primary television display or program, a small background schedule guide that can be easily accessed by a user during lulls in the primary television display or program.

The attainment of the foregoing and related objects, advantages and features of the invention should be more readily apparent to those skilled in the art, after review of the following more detailed description of the invention, taken together with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. **1-3** are diagrammatic representations of a television schedule grid incorporating the user interface for the system and process of this invention.

FIG. **4** is a diagrammatic representation of a screen display used in the system and process of the invention.

FIGS. **5-7** are additional diagrammatic representations of the television schedule grid incorporating the user interface for the system and process of the invention.

FIG. **8** is a flow chart for understanding the operation of the FIG. **7** diagram.

FIGS. **9-10** are additional diagrammatic representations of screen displays of the user interface for the system and process of the invention.

FIG. **11** is a flow chart for understanding the operation of the FIGS. **9-10** diagrams.

FIGS. **12-13** are diagrammatic representations of taping and tape index screen displays of the user interface for the system and process of the invention.

FIGS. **14-17** are diagrammatic representations of program selection by category screen displays of the user interface for the system and process of the invention.

FIG. **18** is a flow chart for understanding operation of the FIGS. **14-18** diagrams.

FIG. **19** is a flow chart for understanding operation of the FIG. **20** diagram.

FIG. **20** is a diagrammatic representation of a channel customization screen display of the user interface for the system and process of the invention.

FIG. **21** is a diagrammatic plan view of a control panel for the system of the invention.

FIGS. **22***a* and **22***b* are block diagrams of television schedule systems in accordance with the invention.

FIG. **23** is a block diagram of a system for interfacing a cable television decoder to a television accessory in accordance with one aspect of the invention.

FIG. **24** is a more detailed block diagram of the system shown in FIG. **23**.

FIG. **25** shows a setup screen for a background guide according to one aspect of the present invention.

FIGS. **26***a* and **26***b* show Background guide presentations according to one aspect of the present invention.

FIG. **27** shows a screen presentation according to another aspect of the present invention.

FIGS. **28**A and B illustrate grazing functions according to a particular aspect of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

I. User Interface

Turning now to the drawings, more particularly to FIGS. **1-7**, there are shown a series of menu screens **10**, **12**, **14**, **16**, **18**, **20** and **22** used in operation of the system and carrying out the process of the invention. Screens **10**, **12**, **14**, **18** and **20** each consists of an array **24** of irregular cells **26**, which vary in length, corresponding to different television program lengths of one half hour to one-and-one half hours or more. The array is arranged as three columns **28** of one-half hour in duration, and twelve rows **30** of program listings. Some of the program listings overlap two or more of the columns **28** because of their length. Because of the widely varying length of the cells **26**, if a conventional cursor used to select a cell location were to simply step from one cell to another, the result would be abrupt changes in the screens **10**, **12**, **14**, **18** and **20** as the cursor moved from a cell **26** of several hours length to an adjacent cell in the same row. Such abrupt changes disorient a user of the system.

An effective way of taming the motion is to assume that behind every array **24** is an underlying array of regular cells. By restricting cursor movements to the regular cells, abrupt screen changes will be avoided. However, there is now a

potential ambiguity between the underlying cell which governs cursor movement and a visible cell **26** which holds the program title.

Viz.: if the cursor moves in half hour steps, and the cell length is, say four hours, should the cursor be ½ hour long or four hours long? If the cursor only spans the interval of the underlying cell (½ hour), the cursor appears to be highlighting a segment of the cell, which is misleading. On the other hand, if the cursor spans the entire four hours of the TV listing, the cursor underlying position will be obscure. In this case, cursor right/left commands will appear inoperative while traversing a long cell. The absence of feedback following a cursor command is befuddling to users. Therefore, an innovative cursor **32** (FIG. **1**) for the irregular array **24** is required which satisfies several conflicting requirements.

With the cursor **32**, the entire cell **26** is 3-D highlighted, using a conventional offset shadow **34**. The offset shadow **34** is a black bar that underlines the entire cell and wraps around the right edge of the cell. To tag the underlying position—which defines where the cursor **32** is and thus, where it will move next—portions **36** of the black bar outside the current underlying position are segmented, while the current position is painted solid.

For an half hour cell **26**, the offset shadow's underline bar will always be solid black. FIGS. **2** and **3** show the cursor **32** as it appears for a half-hour program. For programs that go beyond ½ hour, only the current ½ hour position will be solid black. All remaining positions will be stripped. If the cursor is moved left or right, the solid section will move accordingly, providing complete visual feedback. Thus, this modified 3D offset shadow cursor **32** satisfies the demands stated above it spans the entire cell, yet clearly highlights the current underlying position. Movement of the cursor **32** will always be visible even for cells **26** that are much longer than the underlying cell.

A grid continuity icon **38** is shown in FIG. **1**. Printed grid television schedule guides often include parenthetical comments, (such as "cont'd") to indicate program continuity. In an electronic guide displayed on a TV screen, limited text space precludes parenthetical comments. To conserve space, an icon **38** will be used to indicate cell **26** continuity. At the border of a cell **26** that is continued to the next screen, an arrow icon **38** pointing to the right will be overlaid. The arrow direction always points to right, which is the direction of program elapse.

FIGS. **2** and **3** show recording status representations. When a program has been selected for recording, its listing cell **26** will be outlined or highlighted in red, as indicated at **40**. If guard time has been added or deleted, the cell will be stretched or shrunk to reflect the change. Cell **26** continuity will be treated the same as above. There are four other record status representations:

If the cell is actively being recorded, the outline **40** will blink off and on.

A recorded cell will be displayed with a solid red background **42** (Note: Not shown in drawing).

A mis-recorded cell will be indicated by red hash-marks **44** over the title. A mis-recording can be the result of insufficient tape, VCR loss of power, stopped before completion, etc.

A program linking icon **46** is shown in FIG. **5**. After each schedule update, the schedule system examines the new listings for the occurrence of any titles that match a title in Linked Titles (FIG. **23**). If a title matches, it will automatically be tagged for recording. When a linked program is displayed in the guide, it will have two identifiers: a red outline **40** indicating that the title has been selected for recording, and a link icon **46** appended to the title to indicate that this title was link-selected. After a linked program has been recorded, it will be treated like any recorded program with the title shaded in red. To differentiate this recording from others, the link icon will remain appended to the title.

Further details on the linking feature are given in screen **19** of FIG. **23**. 1) A linked program **47** may be suspended by the user (perhaps to avoid conflict with a pending recording), by de-selecting the link title in the Link List screen, under the Record Memo command. A suspended link program will still be identified by a link icon, but the red-outline will be suppressed since the program will not be recorded. 2) A smart link process is used to tame the matching of titles when there is a likelihood of excessive candidates for recording. The Lucy show, for example, is often syndicated on several channels, each running a different vintage series of Lucy. Untamed linking may result in a plethora of recording, mixing segments from one vintage with segments from another vintage. To differentiate vintages of a series, each Lucy vintage can be given a distinct title. For example, one may be entitled "The Lucy Hour", while another may be "The Lucy Show", etc. However, due to syndication right overlaps, it is possible for two or more television or cable TV stations to carry the same vintage of a series, but still be running different segments of the same vintage. For such series, the link list will include the channel and time as well as the link title. For the avid Lucyphile, the user can locate each series individually for linking. If there is more than one link title of the same name, the series will be numbered, in the order of acquisition. Thus, the second Lucy will be identified as Lucy (Two), at **47**.

FIGS. **1-3** show the columns **28** headed by half-hour header status indicators. The ½ hour header strip across the top of the grid TV guide has two auxiliary functions: 1) as an indicator **48** of pending or in-progress recording scheduled at that time, and 2) as a time-bar **50** to delineate the past from the future. The past is darkened, while the future is lightly shaded. If there is an in-progress recording, the ½ hour header will be red-outlined at **48** in the same manner as a pending recording title cell **26**.

FIG. **6** shows a television schedule grid screen **20** with a program note overlay **52**. With limited text capacity on TV displays, it is preferable to display as many lines of TV listings as feasible. To handle program notes, which are text intensive, on-demand overlays **52** are used. Program note overlays **52** may include any or all of the following information:

A program genre
Program description
Stars and personalities
Year of release
Episodic subtitles
Run-time of program
Elapse time of the program
Critique (Star Ratings)
Rating (PG, G, etc.)
Call letter, channel markers
Closed caption, stereo.
Pay Per View Program

Program notes for a selected program are overlaid over the grid guide upon request. The program note can be toggled off/on using a SELECT command. The program note **52** overlays and hides 3 or 4 listings of a guide. To minimize concealment of the guide, an auto-roving note is used. The program note will overlay either the top half or bottom half of the screen, as necessary to avoid masking the title of the selected listing. If the cursor **32** is in the upper half of the screen, the note will appear in the bottom half, and vice versa.

If the cursor **32** is moved to the lower half of the screen, the note will automatically position itself in the upper half of the screen.

FIGS. **1-3** and **5-6** show a channel column **54** in the television schedule grid **24**. Favorite stations and cable channels may be listed together to create a personalized grid guide. The channel column **54**, unlike most printed TV guides, has a mix of over-the-air station names and cable services names.

The grid **24** guide lists channels by favorite combinations of station number and cable names, and not in the usual numerical order. Note that the order of channels can be arranged in any sequence, and need not be the numeric grouping followed by alphabetical grouping, as shown in the figures. For example, the first channel of column **54** may be DIS, followed next by channel 44, next by A&E, next channel 4, etc. The method of rearranging the channels is described in detail below. When viewing the grid **24** guide, a Tuner Up/Down channel command will be mapped according to the channels and order listed on the screen. When not viewing the guide, the tuner sequence will revert back to the usual numerical order. When the last channel on a page is reached, the next Tuner command will change the channel to the channel listed at the beginning of the following page.

When a channel to which the tuner is tuned is displayed on the grid **24**, it is highlighted, as shown at **56**. A grid **24** page may be changed by either a page command or by entering a channel Up/Dn command as described above. If a page is turned using the page command, the current channel is now located in the previous page, and will not be seen in the new page. Therefore, the new page must suppress the highlighting of a channel, since that indicates the current channel. Note that information about the current channel will still be presented in the channel information boxes **58** at the bottom of the screen.

When is the highlighting re-enabled? Once into the new cage, the first channel up/down command will cause the tuner to automatically change to the channel listed in the last or first row **30** respectively of the new page. Since the toner channel is now located on the new page, the current channel will be highlighted again.

If the channel highlighting is not suppressed after a page is selected, by definition, the tuner must be changed to track the highlighted channel. This is undesirable since casual paging should not cause the channel to change.

When a guide is first opened, as shown in FIG. **2**, both the cursor **32** and the current channel 56 are situated on the same row **30** of the grid **24**. When the channel **56** is changed, it is desirable to drag the cursor **32** along with the channel in unison. In doing so, the cursor **32** will be ready for a Select command (to retrieve the program note) or for a Record It command. Cursor dragging by the channel command takes place whenever the channel **56** and cursor **32** are united on the same row. If they are not united, the cursor **32** is disengaged from the channel command. Note that dragging is not reciprocal; moving the cursor **32** does not affect channel selection.

FIG. **7** shows a screen **22**, showing a program list **58** for a single channel, generated by toggling a user What's On TV command, which switches between the grid **24** and the list **58**. The list **58** consists of rows **60** of sequential program listings on the channel and a channel information field **62**. Program notes are overlaid on the list **58** in the same manner as shown in FIG. **6** for the grid **24**.

Each What's On TV command alternates between the grid guide **24** and the What's Next on Channel row guide **58**. While viewing the grid guide **24**, the next What's On TV command will replace the grid guide **24** with a single-channel row guide **58**. FIG. **8** is the flow diagram for the What's On TV command.

The page relationship between the two guides **24** and **58** are tightly coupled. The single channel guide will open to the channel and schedule time that was selected by the cursor **32** on the grid **24**. While viewing the single channel guide **58**, the Up/Down channel command may be used to change the channel to be listed. When exiting the single channel guide **58** and returning to the grid guide **24**, the grid cursor **32** will be pointed to the channel and schedule time last selected on the single channel guide **58**.

FIGS. **9** and **10** show channel grazing overlays **64** and **66** that provide information on current programs when switching channels while watching television. In the overlay **64**, when scanning channels, the title of each program is overlaid at **68**, along with the name of the TV service (HBO, ABC etc.), the cable channel number, and the current date, day of week, and time in the channel information field **62**. The overlay **66** is the same as the overlay **64** except that this overlay includes a program note **70**, which is similar to the program note **52** in FIG. **6**, but contains information pertinent to a program currently being broadcast on the selected channel. To access program notes, press the Select key. In addition to the program note **70**, elapsed time is indicated by a percentage calibrated time bar **72**. The bar is bracketed by S for start, and F for finish. By default, titles will appear automatically when channels are scanned. Grazing Titles may be de-activated using the CANCEL key. To restore auto-titles, press Select while viewing TV. The low diagram governing titles/program notes, while viewing TV, is shown in FIG. **11**.

An express recording screen **74** is shown in FIG. **12**. The express recording screen includes the following information:

Title of Program
Length of Program
Tape Time Remaining
Recording Speed.

FIG. **13** shows a tape index screen **76**. Locating a recorded segment is often an arduous task when several programs have been recorded on the tape. Without a table of contents, the VCR users muddle through stretches of recording trying to find what's recorded on the tape, where the beginning of the desired program is, and where the tape is now. Some premium VCRs provide tape indexing that automatically finds the start of each recording. However, while the viewer can find the start of a recording, the indexing VCRs do not record titles. The net result is about as useful as a having a table of contents without chapter titles. Considerable searching is still required to find what is recorded at each index. The tape index screen **76** provides a virtual tape directory, giving the equivalent function of a table of contents for a tape recording. There is a list **78** of titles of recorded programs, a pointer **80** to the start of the program, and a current position indicator cursor **82** showing the "chapter" location on the tape. The virtual directory is automatically compiled, revised and stored in off-tape memory as the user records over the tape.

The What's on Tape command will display a list of titles of programs recorded on the tape. The title of the selected program (the segment of tape that is positioned over tape head) is highlighted by the cursor **82**. The tape position pointer **80** dynamically tracks the current tape position. All searching is done simply by title, bypassing the need for index numbers. To play back a program, the up/down cursor command is used to select the program. For example, to play back Judge, the down cursor is pressed until it highlights the program Judge. As seen in FIG. **13**, the tape head is currently positioned over Star Trek with the cursor on Star Trek. When the cursor is

roved to Judge, the tape will immediately begin going forward to the start of Judge. Although the cursor immediately underscores the Judge listing the tape lags behind as shown by tape position indicator **80**, which will be gradually moving down. To graphically portray tape movement, a tape motion indicator field, block **100**, is provided, as explained below.

The tape directory is equivalent to a table of contents showing titles, but not page number. It automatically opens to the starting page by simply pointing to the title of the program. In addition to the tape directory **78** of recorded programs, the screen **76** includes a program duration field **84**, a recorded speed of each title field **86**, a remaining time left on tape field **88**, a remaining time left on program field **90** and a next scheduled recording time field **92**.

The virtual tape directory is generated as follows. It is difficult to implement a competent self-contained tape directory for a non-random access storage such as a video tape. No matter where the directory is stored on the tape, the latent access time to locate the directory and return to current position (for a standard six hour tape) is excruciating slow, in the order of 6 to 10 minutes.

If redundant directories are recorded uniformly across the tape to minimize latency time, the problem of sluggishness is merely shifted from playback to updating the multiple directories. After each video program is recorded, the entire tape must be scanned to update each directory. Even if this update process is automated, there is a question of excessive wear on tapes and the VCR itself. Viz.: each recording, no matter how short, results in high-speed scanning of the entire tape in order to revise all directories.

Even more troubling is the question of when to perform the update, since there is no "safe" period for the VCR to take control. For example, the user may have stopped the tape momentarily, perhaps to skip commercials, only to find that the VCR has commandeered control and place the tape in a high speed update rode. The safest update is one that is user-initiated. Unfortunately, few VCR users will follow a regimented procedure of updating after each recording session. Clearly, an on-tape directory based on existing technology is not satisfactory.

The following innovative solution, the "virtual tape directory", stores directory information in off-tape memory and does not require an on-tape directory or any augmentation of the video cassette. Since the directory is held in external memory instead of the tape, it is best suited for tapes that have recently been played and recorded, the "working tapes".

When a program is recorded, the title of the program is written to the data (control track) channel of the tape and, at he same time stored in a non-volatile (NV) memory. Other information about the recorded program, such as length of program, theme category, date recorded, and tape identifier code may be written to the data channel, as well as stored in the NV memory. The NV memory is adequate to support a number of working tapes.

When a tape as first loaded, the tape data channel will be scanned for a few seconds to identify the recorded program under the tape head. This data will be matched against the directories stored in NV memory. If there is a match, the directory of the working tape will be-displayed immediately when the What's On Tape key is pressed. The "virtual" tape directory appears to have been read from the tape, but is actually obtained from NV memory.

If there is no match, a new directory for the tape will be created. During playback and recording of this tape, a virtual directory will be generated for that tape. Directories of inactive tapes will be automatically purged from memory as new working tapes are introduced.

The foregoing off-tape realization of the virtual tape directory is an approach that can be implemented without any alterations to existing video cassettes. However, with minor augmentation of the video tape cassette and video recorder mechanism, a true random-access permanent directory for each tape can be realized.

In a preferred implementation, a digitally encodable read\write planar magnetic strip is located on a surface of the video cassette. Ideally, the strip will be located on one of the four planes which are orthogonal to the direction of video cassette insertion, for a front loading VCR. A most preferred location is on the face of the video cassette, which is usually reserved for a 1½" by 2" label. In the video recorder, a read\write magnetic head is located to be aligned with the magnetic strip as the cassette is inserted. The head comes into contact with the magnetic strip when the cassette is loaded or removed from the recorder. As the cassette is inserted, the stored data from the strip will be read and transferred to the tape directory buffer of the electronic guide. When programs are recorded on or erased from the tape, the content of the tape directory buffer will be updated to reflect the program content and index location of the program on the video tape. As the video cassette is ejected from the recorder, the content of the tape directory will be transferred to the magnetic strip on the video cassette. By augmenting the video cassette with a random access rewrite permanent memory, directory information for the tape is retained long after a video record session. This method is a significant improvement over using the tape media itself to record directory information.

In the above method, the movement of the video cassette magnetic strip during cassette insertion and ejection over a stationary magnetic head allows the magnetic flux changes to be sensed. Alternatively, a moving or rotating read\write magnetic head mounted on the video recorder can be used to scan a stationary magnetic strip after the video cassette is loaded. In this variation, data from the magnetic strip can be read and updated immediately from the tape directory buffer. Such magnetic strip encoding is similar to that commonly used in credit cards, personnel identification tags, security entrance cards, etc. As another alternative, optical read\write methods may be used instead of magnetic encoding.

It is relatively easy to estimate remaining time of a scheduled televised program with the assist of a clock and a TV schedule. In contrast, there are few clues as to current location during playback of a recorded program, particularly when there are several recorded segments on a tape. Tape index counters or running-time clocks require diligent bookkeeping before the start of a recorded segment. Few consumers will tinker with 5 or 6 digit numbers when a "ballpark" indicator is adequate, such as, "is the program about over?", or "about when does the next segment starts?". Clearly, there is need to provide a location indicator without the burden of bookkeeping.

To provide an at-a-glance indicator of relative tape location, an on-screen tape position gauge **94** has been devised. The tape position gauge **94** consists of a vertical bar **96** with the arrow pointer **80** located on the left edge of the screen **76**. The arrow **80** dynamically tracks the current tape position as the tape is advanced or rewound.

The gauge **94** is graduated, not in linear units, but in units of recorded segments **98** with each segment labelled with its program title. Thus, a 10 minute program or a 6 hour program is represented as one vertical unit corresponding to the height of the left vertical edge of a title line. Since the left vertical edge of a title is the same for all programs (independent of program duration), the position indicator is only a rough approximation of actual tape position. If the arrow is pointing

at the upper 25% of the left vertical edge of a title line, it indicates that the tape head is positioned approximately into the first 25% of the program. If a conventional linear gauge were displayed, a far more complicated gauge would be required, that would likely confuse rather than clarify.

As noted by the tape position indicator **80** in FIG. **13**, the tape head is positioned to the start of Star Trek. If the viewer wishes to play back another program, the cursor is simply moved until it highlights the desired program. As soon as the cursor is moved to another program, the tape will immediately go forward or backward to the selected program. Tape position pointer **80** will move very slowly if it is scanning past a long program. This motion may not be readily apparent. To provide an unequivocal graphic representation, a tape motion indicator field, block **100**, indicates direction of scanning and whether the tape is being prepared for playback or for recording.

Thus, this tape gauge **94** provides a quick capsule indication of the where the tape head is currently positioned, relative to the current program, and relative to other programs or the tape, and the title of other programs.

The tape index screen **76** includes a tape motion indicator field **100**. When the tape is undergoing high speed repositioning, the What's On This Tape (WOT) screen **76** will be displayed. During high speed search of a long program, the tape gauge **94** will appear to be dormant, since the gauge is relatively coarse for programs of long duration. To supplement the tape gauge **94**, the tape indicator **100** is included. During high speed positioning, one of these messages will be displayed in the space above twin-hub tape icon **102**: GO PLAY, GO RECORD, FORWARDING, REVERSING, PAUSE, and STOP.

GO PLAY is displayed while the tape is repositioning to the selected title. When the title is reached, the WOT screen **76** will be displaced by the playback video. GO RECORD is displayed while the tape is positioning to the selected program segment **98**, where the new recording will be written.

FIGS. **14-17** show Theme function screens **104**. The Theme function allows the viewer to quickly sort the downloaded schedule and display a subset schedule based on a subject of interest. The user has the freedom to select listings sorted first by major themes, second by topic(s) within a theme, and/or by topic qualifiers. All guides sorted by theme, topic and qualifier will be displayed in a row-tabulated format and begins by listing programs nearest to the current half-hour. The theme function screens **104** have the following attributes: Rotating Themes. There are four theme categories, with each theme title enclosed in horizontally-arranged selection boxes **106**. From left to right, the themes are: [Movies] [Sports] [Specials] [TV Fare] FIG. **18** is a flow diagram defining the Theme command. Topic Selection. There are up to 16 topics **108** for each theme arranged in an 8 row by two column field **110**. Any number of topics may be selected under a selected theme. Topics is a logical OR function, meaning that each listing that meets the definition of the topic will be displayed. For example under the theme of Movies, if the topic titles Comedy and Satire are selected, a subset schedule of both comedy movies and satire movies will be displayed. Other qualifiers may include a Pay Per View selection box in addition to the Live selection box of FIGS. **16** and **17**.

Default All Selection: when the Theme screen **104** is first opened, the first slot (upper left most topic **108**) will be highlighted. This is the ALL function, Which is the sum of all topics **108** for the selected theme. The ALL function was created to minimize key stroking.

Without an all topic category, the user must enable all 16 topics **108** individually. Conversely, if the user wishes to go from an all topics to an individual topic, the user rust cursor to and deselect each of the other 15 topics.

Qualifiers: each theme includes a group of search attributes or qualifiers **112**. The qualifiers for each theme **106** are shown in the respective one of FIGS. **14-17** for each theme **106**. Any number of qualifiers can be enabled at one time. These qualifiers perform a logical OR functions; they will select for display all listings (sorted first by theme and topic) that satisfy the qualifiers.

The qualifiers **112** are positioned for easy selection. The selection of qualifiers is made using the usual cursor commands. When a theme **106** is initially opened, by default, the cursor is located near the top of the screen. To minimize cursor commands, the qualifiers are also located near the top of the screen. In contrast, placing the qualifiers at the bottom of the screen would require a round trip of up to 16 key strokes.

The complete theme sorting strategy is defined as follows:

Listings=(Topic A+Topic B+etc.)*(Qualifier A+Qualifier b+etc.)

This may be read as listing all Topic A that also meets Qualifier A or Qualifier B, plus all Topic B that also meets Qualifier A or Qualifier B, etc. For example, the qualifier field of FIG. **14** includes four star ****, three star ***, two star ** and one star * rated TV programs, based on the auxiliary schedule information described above. By selecting both the **** and *** boxes, only programs that have at least a three star rating will be listed. Other criteria, such as year of release, may also be included as a qualifier field. In this case, the guide will restrict listings to movies or TV shows released during a specified year period. The year period may be implemented with two selection boxes: the first box indicating the start year and the next box indicating the end year. To change the year window, the year values may be incremented or decremented with the page up/down keys when a year box is selected.

Qualifiers, topics and themes are rooted in relational database operations and allow logical sorting of the schedule. To support these higher order of sorting, auxiliary data must be delivered to the VCR. In contrast, simple sorting operations, such as sorting by time and by channel are inherent in the fundamental information of a TV guide, and do not require auxiliary search data.

The keystroke sequence for using the themes screens **104** are as follows. While watching TV, the first Theme key command will summon the opening theme screen with the left most theme, Movies, highlighted. Further theme commands will rotate the theme selection from left to right. Each theme screen will be initialized to the ALL (topics) selection. If no topic selection is made, an all topics guide for the selected theme will be displayed upon depressing the Select/Goto command.

To additionally sort the theme by a single topic, position the cursor key to the desired topic and depress the Select/Goto key. Use the cursor to return to a topic.

To sort by more than one topic, position the cursor over each desired topic and depress the Select key. When finished, press Select/Goto to display a multiple-topic guide.

To sort by one or more attributes, position the cursor over each desired attribute and press the Select key. When finished, move the cursor to a topic and press Select/Goto to retrieve the theme/attribute-sorted TV guide.

Other than express recording, all recording activities are controlled with the Record Memo screen **16** of FIG. **4**. The Record Memo screen **16** is accessed with a Record Memo

key. When the Record Menu key is depressed, the following titles enclosed in horizontally-arranged selection boxes **114** will appear at the top of the opening screen. From left to right: [Pending [Recorded [Linked [On-Grid Recordings] Programs] Titles] Prog.]Each Record Memo key command will highlight a new selection, rotating from left to right, and wrapping around to Pending Recordings after the right most position. FIG. **19** is a flow diagram defining the Record Memo command.

FIG. **20** shows a Channel Customization screen **116**, which is an example of one embodiment of a channel selection menu. The screen **116** allows the user to customize channels to match viewing interest, providing a compact listing as well as eliminating undesired channels during up down scanning. During schedule update, a list of all cable channels available at the subscriber's cable system (or broadcast stations for over-the-air subscribers) is also delivered to the VCR. This unabridged set of channels may be customized using screen **116**.

The channel customization screen **116** has two fields, a 3 column field **118** listing up to 36 unabridged channels and a single column field **120** listing 12 favorite MY channels. The latter is a replica of the channel descriptor column **122** (FIG. **1**) of the opening grid guide. Additional pages are available (using the page key to swap between the pages) to accommodate systems with more than 36 channels. Each cell **124** in the 3 column field **118** contains the following information:

Channel number and program service name (such as HBO or station KTVU, 2). The cell **124** is color-coded to indicate the following states:

ON, default state before any customization, with the cell **124** in light green background.

MY, favorite channels listed in the single column field **120**, also shown in the three column field **118** with a blue background.

OFF, a channel deleted from all guides, as well as during Channel Up/Dn scanning (still accessible using the ten key channel keypad). OFF cells have a gray background.

When first installed, the system assigns the first 12 (listed in numerical order) channels as MY favorites. The channel status may be changed by selecting a channel and picking a state, MY, ON, or OFF using the SELECT key. Since only 12 favorites are allowed, the user must first remove a favorite channel by changing the status of an existing favorite channel to OFF or ON. When that is done, the first column will automatically open up a space for the next MY selection. When a new MY is selected, the MY column **120** will automatically insert the new selection in the prescribed order. The order of listing in the MY favorite channel column **120** is as follows:

All favorite broadcast stations will be listed first in numerical order. Next, all cable services will be listed in alphabetical order.

A new cable service, which displaces a previous service, will be inserted under the previous status. Example: If the channel was MY, the new service will be MY. However, a new cable service that appears on a new channel will be initialized ON.

In another embodiment of the channel customization method, any number of channels may be arranged to suit the preference of the viewer. In this approach, column **54** is not required and is not displayed. Instead, any channel listed in the three-column field may be re-ordered in any sequence desired. In this method, a channel whose order is desired to be changed is selected using a cursor. A destination slot is then selected and the transfer is made, with intervening channels being adjusted in position towards the source slot. For example, to move channel 30 DIS to the number one slot (shown occupied by channel 2, KTVU), the source channel (DIS) is first highlighted by positioning the cursor and pressing the SEL/GOTO key. The selected channel will then appear as slightly offset from its normal position (not shown in the drawing). The Up/Down cursor commands are then used to move the cursor to the destination slot (KTVU), and the SEL/GOTO key is then pressed again. Channel 30 (DIS) will then appear in the first slot, and all channels that were previously from the destination slot to just above the source slot will be moved down one slot. If a channel is moved to a lower position rather than a higher position, all channels previously from the destination slot to just after the source slot will be moved up one slot.

In yet another embodiment of the channel customization method, the viewer can re-order channels using a drag and drop method. Again, the cursor is used to select a channel in a source slot. An image representing the channel symbol is then dragged into the desired destination slot for the channel and dropped, and intervening channels are adjusted as discussed above.

Another embodiment employs channel customization prompt menus to re-arrange channels. In this approach, each channel label is sequentially displayed over time in a default sequence (such as numeric/alphabetic sequence, or according to the previously selected user-sequence). The channels are preferably displayed one at a time. The viewer can select a priority for each channel as it is displayed, or can skip to the next channel label. If a priority is given, the channel will be moved into the channel slot corresponding to the entered priority, as if it were selected and moved into that slot as discussed above. The priorities that may be assigned range from 1 to 9, the highest number on the numeric keypad (in some embodiments 0 is used to represent 10). Note that the total number of channels that can be re-arranged is not limited to the number of priorities (9). For example, the user could assign the same priority (such as number 1) to as many channel labels as desired. The last selected channel label would then appear in the number 1 slot, with the remainder immediately following below, according to the order in which they were selected.

FIG. **21** shows a front panel **130** for a remote controller of the schedule system. The top half of the front panel **130** corresponds to a conventional remote controller for a television set and a VCR. Included are a dual function ten key keypad **132**, with the alternate functions of each key and its digit shown, a TV/VCR toggle key **134**, volume and channel up/down keys **136**, and VCR control keys **138**. The lower half of the front panel **130** contains control keys that are specific to the schedule system. Included are a What's On Tape key **140**, a What's On TV key **142**, a Theme key **144**, a Record Memo key **146**, a Record It key **148**, a Link It key **150**, a Help/Menu key **152**, a Select/Goto key **154**, Left, Right, Up, Down and Page Cursor keys **156**, a Return TV/VCR key **158** and a Cancel/Undo key **160**. The use of these keys has either been explained above or is apparent from their labels.

FIGS. **22**A and **22**B are block diagrams of television schedule systems/tape controllers **180** and **182** in which the user interface is used. The schedule system/controller **180** is applicable to existing television equipment, where the schedule system is separate from the basic television equipment. Programmable tuner **202** is shown as part of a cable decoder. The schedule system/controller **182** is shown as integrated into a VCR **211**. In this version, a cable decoder is not required, and tuner **207** is part of the VCR **211**. It should be clear from these two systems **180** and **182** that the schedule/tape controller may be integrated into other television equip-

ment, such as a cable decoder or a TV/Monitor receiver. It is also practical to implement the entire schedule/tape controller in a remote controller by adding a text display, such as an LCD screen, on remote controller **212**.

In the system **180**, programmable tuner **202**, which may be part of a cable decoder unit, receives a TV signal from antenna **200** and/or from cable input **205**. Tuner output **216** goes to a vertical blanking interval (VBI) decoder **222**, which may be a closed caption decoder or a high speed teletext decoder. Listing information and other support information, such as cable channel assignment data, will be transmitted over the VBI by one or more local stations or cable channels several times a day or continuously.

When update is required, programmable tuner **202** will be tuned automatically to the station or cable channel carrying the data. After the VBI signal is processed by CPU **228**, the listing data is stored in schedule memory **232**, while the cable channel assignment data is stored in cable-specific RAM memory **238**. This data is used to convert generic TV source names, such as HBO, to channel assignments for the specific cable system.

Other information transmitted to the schedule/tape controller **180** and stored in the system RAM memory **240** includes clock update data to set system clock **230** automatically, schedule update time, which may vary from once a day to a continuously transmitted format, new theme categories, and last minute schedule change data.

For a What's on TV request, the listing stored in schedule memory **232** is retrieved, processed by CPU **228**, and outputted to video display generator **224**. Video switcher **226** is enabled by CPU output **246** to select the video display generator **224** output whenever schedule data is to be presented to the TV/monitor **210**.

When a request to time-shift record a program is made, the title of the program and its record parameters (channel, start time and length) is copied from the schedule memory **232** to the Record Memo RAM memory **236**. When the system clock **230** matches the schedule time, the CPU **228** will issue a channel command to the programmable tuner of the cable decoder **202** (tuning it to the selected channel), and a power on and record command to VCR **206** by means of an infrared remote driver **214** directed at infrared input ports of these two devices. In the VCR integrated version **182**, the command to the tuner **207** is made on a wired bus **264**.

In addition to programming by selecting a title from the on-screen schedule, it is also possible to program the VCR **206** or **211** and the cable decoder **202** or **207** with remote controller **212**. In this mode, programming information is entered into the remote controller **212**, and at the desired activation time, the remote controller **212** will issue programming commands to the proper TV device. While there are universal remote controllers that offer programming capability, none allow the user to enter generic names, such as station and cable channel names, and have the CPU convert the names to specific channels for tuning the VCR or the cable decoder. This is implemented by incorporating CPU **228** and he cable-specific RAM **238** in the remote controller **212**.

Remote controller **212** and infrared remote driver **214** are capable of emulating the infrared command instructions required by the cable decoder **202** and VCR **206**. The command emulation codes for the remote driver **214** are stored in cable decoder IFR code RAM/ROM memory **239**. Commands for popular cable decoders and VCRs are pre-programmed in ROM. Alternatively, the infrared commands of the original remote controller may be learned by aiming the controllers at the IFR input receiver **264** and storing the command codes in RAM memory **239** after processing by CPU **228**. This process is well known in the art of universal remote controllers and need not be detailed here.

As shown in FIG. **22**A, the VCR **206** and cable decoder **202** may be manually controlled by remote controller **212**, or it may be automatically controlled by infrared remote driver **214**.

During recording, the tape index location of the VCR **206** will be transmitted over control/data bus **270** to the CPU **228**. This start address information is stored in tape directory RAM memory **234**, together with the program title. The bus **270** also carries VCR control commands for recording, playback, tuner selection, and other functions, including power on/off.

Once a program is recorded, its title and other program information is stored in a section of the Record Memo RAM memory **236**. To play back a recorded program, the What's on Tape request will cause a directory of recorded programs on the tape to be displayed. When a program is selected for playback from this directory, the tape will fast forward or reverse to the tape index location specified in the Tape Directory RAM memory **234**.

In the system **182**, schedule/tape controller **220** is embedded in the VCR **211**. The VCR tape mechanism **252** contains all the record and playback electronics of the video recorder, less the programmable tuner **207**. Data recorded on the control rack of a tape is coupled to the CPU **228** over input bus **258** and output bus **256**. The art of recording data on the control track is well known, for example, in recent VCRs with indexing capability. CPU **228** commands to the VCR **211** are carried over bus **254**. When schedule information is to be displayed, video switcher control input **246** selects the display generator on line **218**. At other times, video switcher **226** selects the output of the VCR mechanism **252** on line **250**. Schedule information may be downloaded from the VBI. Alternatively or supplementally, it may be downloaded from a telecommunication line **370** to modem **268** and to CPU **228** via line **266**. Other means of delivering schedule information can be employed, including the use of a subcarrier channel on the cable service.

It should now be readily apparent to those skilled in the art that a system and method incorporating a novel user interface capable of achieving the stated objects of the invention has been provided. The user interface that is configured to compensate for the particular nature of the television schedule information. The user interface has a cursor operation that compensates for an irregular grid format of the television schedule information. The user interface presents the schedule information in a format that compensates for limited resolution of the television display. The user interface presents supplemental schedule information in overlays that obscure a minimum amount of useful other information. Order of presentation of the schedule information in the interface is customizable by user preference.

II. Cable Decoder Controller

Turning now to FIG. **23**, there is shown a system **2010** for interfacing a cable television decoder **2012** to a VCR **2014** incorporating a television scheduling system of the type disclosed in my above-referenced issued U.S. Pat. No. 4,706,121, which is hereby incorporated by reference in its entirety. As is conventional, the cable signal is supplied to the cable decoder **2012** on cable **2016**, and the decoded output of the decoder **2012** is supplied to the VCR **2014** through cable **2018** on a fixed channel. The decoded output on the fixed channel is also selectively supplied to a television set **2019**, as indicated at **2021**. The VCR **2014** receives commands from its remote controller **2020**. A cable decoder remote control emu-

lator **2022** is connected at **2023** between the VCR **14** and the cable decoder **12**. All channel selection codes supplied to the VCR **2014** by its remote controller **2020** are converted by the remote control emulator **2022** to command codes recognized by the cable decoder **2012**. The remote control emulator **2022** also suppresses execution of the channel selection codes supplied to the VCR **2014**, in order to keep the VCR **2014** tuned to the fixed channel on which the decoded cable signal is supplied.

When the cable decoder mode is selected, channel indicator **2074** (FIG. **24**) of the VCR will show the channel selected by the cable decoder unit. There are two reasons for using the VCR **2014** to display the channel number instead of the cable decoder **2012**: The cable unit may now be hidden from sight, which is desired by most users, and it provides improved infrared isolation of the VCR remote controller **2020** signal from unwanted; pickup by the cable decoder remote input **2056** (FIG. **24**). The benefit of using the VCR **2014** for channel display is that the cable decoder unit **2012** can be made transparent to the user.

One aspect of making the cable decoder unit **2012** transparent to the user relates to the time of control of the cable decoder. Just as the schedule system controls the VCR to begin recording at a desired activation time, the cable decoder is also controlled and set to the desired channel at that time. The desired activation time is stored in memory, along with the channel of the selected program, and these stored values are later used to control the cable decoder. The desired activation time is topically the broadcast time of the selected program. It should also be noted that in order to allow for possible inaccuracies in the local system clock time and for variations in the actual broadcast times, the effective broadcast time employed by the schedule system and remote control emulator will typically include a guard time on the order of a few minutes to either end of the scheduled program time period. Controlling the cable decoder at the time of broadcast is critical to making the cable decoder transparent to the user, because if the cable decoder were not controlled at that time, one schedule request could interfere with another schedule request or with a user manual channel selection. This storing in memory of both channels and desired activation times for program selections is performed whether or not the program selections are being entered through an interactive electronic schedule system or are simply being entered manually from a printed television schedule guide.

The remote control emulator **2022** drives an infrared emitter, which is positioned in front of an infrared input on the cable decoder **2012**. Thus, the remote control emulator **2022** replaces the conventional cable decoder remote controller. The user communicates with the system using the VCR remote controller **2020**. For the user, the system **2010** appears to function in the same manner as would the VCR **2014** connected to the TV **2019** with no cable decoder **2012** present. This means that all functions, including on screen programming and the TV schedule system, provided with the VCR **2014** are fully functional and are operated uniformly by the user and interact with the user uniformly.

Further details of portions of the VCR **2014** and the cable remote emulator **2022** are provided in FIG. **24**. As indicated at **2024**, the remote emulator **2022** is supplied together with the VCR **2014**. The VCR **2014** includes a programmable tuner **2026** connected to an RF modulator **2028** by cable **30**. The cable decoder **12** is connected to the programmable tuner **2026** by the cable **2018**, and the RF modulator **2028** is connected to the TV **2019** by cable **2032**. The remote controller **20** supplies its inputs to a remote receiver **2034** in the cable remote emulator **2022**. The remote receiver **2034** is connected to a central processing unit (CPU) **2036** by line **2038**. The CPU **2036** is implemented with a commercially available microprocessor integrated circuit, such as those available from Intel Corporation, Santa Clara, Calif., or Motorola, Inc., Phoenix, Ariz. The CPU **2036** is connected to a random access memory **2044** and to cable decoder code memory **2046**, which may be either a random access or a read only memory, by busses **2048** and **2050**. The CPU **2036** is connected to a remote driver circuit **2052** by the line **2023**. The remote driver circuit **2052** is connected to an infrared emitter **2054**, which is positioned in front of remote input **2056** of the cable decoder **2012**. The CPU **2036** is connected to the programmable tuner **2026** through a latch **2070** by lines **2071** and **2076** and to a channel display **2074** by line **2072**. The latch **2070** is also connected to the CPU **2036** by line **2058**. The latch **2070** allows the channel data to be shown on the display **2074** to be separated from data which is supplied to the programmable tuner **2026**. Data is supplied to the programmable tuner **2026** only when the latch is enabled on line **2058**.

In operation, the cable remote emulator **2022** is either programmed to learn the cable decoder **2012** remote controller codes in the conventional manner for teaching a remote controller to learn the commands of foreign controller, which are then stored in the cable decoder code memory **2046**, or the memory **2046** contains conversion codes stored in ROM for the more popular cable decoder **2012** models. The TV schedule system, which also utilizes the CPU **2036**, is set to the cable mode by a command from the remote controller **2020**. This causes the programmable tuner **2026**, also forming part of the TV schedule system, to be non-responsive to the remote controller **2020** channel commands, as a result of a suitable control signal on line **2058**, so that the tuner will remain tuned to the fixed channel for the cable decoder **2012**, typically channel 3 or 4. However, the channel commands are stored in memory **2044**. Whenever the TV schedule system requires channel information, it will refer to the stored channel information. For example, when the TV schedule system is opened, it will point to the channel currently being viewed/recorded. When a program is selected from the TV schedule system, the system will automatically generate codes recognizable by the cable decoder **2012** to change the channel on the cable decoder **2012**. When a cable input is not being used, the latch **2070** is enabled on line **2058**, so that channel commands on line **2071** are supplied to the programmable tuner **2026**.

Remote controller **2020** commands are infrared coupled to the CPU **2036** and stored in memory **2044**. When the system **2010** includes a cable decoder **2012**, all channel tuning commands from the remote controller **2020** are inhibited in favor of cable decoder channel commands recognized by the cable decoder and produced by the CPU **2036** through conversion from the channel tuning commands. The conversion code is contained in a ROM, or a RAM if the system **2010** has a "learn" mode. After a delay to prevent potential conflict of two infrared signals, the converted code is coupled to the cable decoder remote input **2056** by the infrared emitter **2054**. The process of emulating codes recognizable by the cable decoder **2012** is done in a conventional manner known in the art. All other commands from the remote controller **2020** are acted Upon in the system **2010** unchanged.

Thus, as discussed above, in one embodiment a system for interfacing a cable television decoder having an input for receiving television signals including a plurality of channels and an output for directing a selected channel from the television signals to a television or television accessory includes a programmable tuning means for selecting a desired television channel signal (connected to the output of the cable

television decoder to receive the selected channel on a fixed channel from the cable television decoder), means (connected to the programmable tuning means) for inhibiting the programmable tuning means from tuning to the selected television channel when the cable television decoder is operational, means for emulating the channel selecting commands of the cable television decoder, means (connected to the emulating means) for transmitting emulated channel selecting commands from the emulating means to the cable television decoder, and means (coupled to the emulating means) for making television channel selections. The means for making television channel selections also includes means for setting a desired activation time for a channel selection, and the system includes a memory (connected to the emulating means) for storing television channel selections and desired activation times for the television channel selections.

While the preferred embodiment is directed to controlling the tuner of a cable decoder, the teachings of the present invention are equally applicable to the control of a tuner of a satellite receiver, a telecommunication fiber optic tuner/receiver used to receive TV programming, or any TV tuner apparatus with a tuner that preselects television programs for recording by a VCR. By controlling the preselection TV tuner, the VCR on-screen unattended recording programming functions need not be duplicated by the preselection TV tuner apparatus. Moreover, the viewer is not burdened with the task of programming more than one TV apparatus.

It should now be apparent to those skilled in the art that a novel system for interfacing a cable television decoder to a television accessory capable of achieving the stated objects of the invention has been provided. The system and method provides a single tuning arrangement which will coordinate channel selection information between a cable decoder and a television schedule system, a VCR or any television device. The tuning arrangement is compatible with already installed equipment. The single tuning arrangement eliminates duplicative programming effort and preserves the advanced features of television devices, such as on-screen programming of unattended recording, even when operating behind cable decoders and other TV apparatus with preselection tuners.

III. Background Guide

This aspect of the invention is directed to a convenient background mode for the electronic guide which presents several lines of guide information, typically occupying the bottom quarter of the screen, overlaying the current television program. The background mode enables the viewer to manually or automatically scroll through preselected portions of the schedule information. This preselected information is not just limited to information about a single current (or otherwise selected) program. This background scrolling guide is particularly convenient during a lull in television programming, such as a commercial break. As a supplement to the full-screen foreground guide, the background mode eliminates the need to master the advance navigation commands of the full-screen guides.

Due to the limited amount of Listing information that can be displayed in the background guide, preselection of the listing is essential. An indiscriminate scrolling of every listing in a typical one week guide would require 8 hours, even if each listing is scrolled at a rate of one per three seconds. Limiting the listings to a fixed time period, such as the current day, current hour, or primetime is a first step toward implementing a useful background guide. Other selection criteria, such as channel or theme, can be logically combined to further filter the listings down to a total that can be read in a fraction of an hour.

In existing non-interactive scrolling guides available on some cable systems, the listing cannot be controlled by the viewer. Each time the viewer switches the tuner to the guide channel, the listings is at some random point in the one week guide. Listings are grouped chronologically, by day and start time. Under each group are channel identifiers arranged numerically or by cable source name if it is a listing for cable-TV programming. Without user interaction, there is little chance that the viewer will randomly tune to the guide channel and see desired listings at the desired time and channels without a tedious wait. For an interactive background guide, the ability to resume and continue forward from the last listing is highly desirable.

In the present invention, there is a concept of a guide session which allows the user to open the background guide repeatedly, interleaved with non-background guide activities, such as watching TV or using the foreground guide. During a session, specific setup criteria for the background is persistent and stored in electronic memory. This may include the time-period over which the listings are scrolled, whether the scrolling is manual or automatic, the channel of the last listing, whether sorting by theme has been setup, whether sorting by favorite channels has been setup. One or all criterion may be manually changed without terminating a session. Some criteria may be automatically changed if the cursor or setup of the foreground guide is changed. A session is completed if the background guide has not been accessed for a certain period of time, or the user manually selects a new session. A typical setup screen for the background schedule guide is shown in FIG. **25**, in which setup screen **3010** occupies all of television screen **3020**.

During a session, each time the viewer opens the background guide, the initial listing will continue from (or repeat) the last listing displayed in the previous background guide access. The pointer to the current listing within a set of schedule information is known as a tab. The tab can be advanced by manual or automatic scrolling. Additionally, if the current system clock time catches up to a tab in a time-indexed set of schedule information, the tab can be pushed forward from then on in step with the system clock until overridden by a user. The tab is pushed forward as broadcasts end. If the system clock surpasses the tab, once all programs at the tab time setting are over, the tab setting will be advanced.

The default setting for the tab when the guide is first opened is the earliest start time of any program that is still being broadcast at the time the guide is opened. The tab is then advanced, and listings printed, repeatedly, until the guide screen space is filled. From that point on the tab can be advanced by either manual scrolling or automatic scrolling. Automatic scrolling can be at a fixed number of listings per time period, or can simply be from the tab being pushed forward by program broadcasts ending, as described above.

A session does not end when scrolled to the end of the time period window, but repeats itself when all listings in a time-period have been scrolled. By providing persistent storage of the last time-period, the last listing, or tab, within the time period, the last channel, and the setup criteria for the foreground guide, the viewer is freed from the chore of remembering and reentering a host of background setup criteria each time the background guide is opened. This is illustrated in FIGS. **26***a* and **26***b*. FIG. **26***a* shows the display of a background guide **3110**. If at three o'clock the user suspends the background guide for an hour, and then reactivates it within the same session, the display upon reactivation would be as shown in FIG. **26***b*. Background guide display **3120** of FIG. **26***b* is determined by the same stored operating characteristics such as theme, time period, manually scrolling, automati-

cally scrolling, etc., as were used for the display of FIG. **26***a*. Note that the tab, or the pointer to the current listing, has been pushed forward from three o'clock to four o'clock by the advancing time on the system clock. The status of displays **3110** and **3120** are substantially the same, except that the passage of time causes the displayed schedule information to only partially overlap.

In the preferred implementation, pressing the background guide command once will start display of a background guide. It will list programs according to previous criteria selected by the setup menus for the background guide and the foreground guide. Depending on the prior setup, the background guide may automatically scroll, or may be manually stepped using the Page Up/Dn keys. The channel of the background listings may be sequenced by pressing the Channel Up/Dn key. Depending on the background mode selected, pressing a Channel key will cause the listing to jump to the next channel that is defined either by the Channel Up/Dn keys, or according to the sequence defined under the foreground guide. Pressing the TV, Guide, or Theme key will terminate the background guide display, but not the session.

To change the mode of the background guide, the background guide command is entered again while a background guide is displayed. A background guide setup menu will be displayed displacing the background listings. One such setup screen **3010** is shown in FIG. **25**, in which setup screen **3010** is shown to cover the entire television screen **3020**. In alternative embodiments, the setup screen occupies only the same portion of the television screen as the background guide. From the setup menu, the viewer may select another background mode:

Scroll current listings for all channels. This is the default mode when a new session is started.

Scroll listings for current channel,

Scroll listings according to the selection criteria when the foreground guide mode was last exited,

Scroll according to the theme criteria when the theme guide was last exited.

The setup menu also allows the viewer to change the time period from the default period. The default time period is the current time to programs starting in the next 3 hours. The time period is shown by start time block **3030** and end time block **3040**. At the end of the time-period, the listing will loop back to the start of the time-period. If there is a Primetime command, actuating this command will cause the time-period to be automatically set to the designated primetime. The viewer can also select a new session, in which all the default selections (including the default time-period) will be reinstated.

The following is a detailed description of each mode:

1) All selected channel scroll. This is the default mode when a new session is started. The first listing of the background guide is for the program on the current tuner channel. Pressing the page up/down key momentarily will manually advance the listings starting with the listing group for he current time. When all channels with the current start time is displayed, the next group of listings for the next star time will be displayed Pressing the page key for 3 seconds, or longer, will start automatic scrolling of the guide. The guide will scroll through all channels which have been declared favorites in the foreground grid guide. If the favorite channel menu has not been setup, by default, all channels will be considered favorites. Typically, all channels listed in the opening few pages of the grid guide are favorite channels.

a) Pressing a channel key will cause the listing to jump to the next channel listed in the grid guide. The Up channel key will cause listing to advance to the next higher listed channel, and to the previous listed channel for the Down channel key. Pressing the page key momentarily will cause scrolling to stop. The next page key command will resume manual scrolling of the background guide.

b) Pressing the primetime command will change the time-period to match the primetime period. the latter has a default time of 7 PM to 11 PM, but may be defined by the user when setting up the foreground guide.

c) The viewer can immediately change tuner channel to one that is displayed in the background guide by pressing the Enter key. The background mode is not exited, and the viewer may continue scrolling the background guide.

d) To exit, press TV or any other mode command

e) To resume the background mode last selected, press the background guide key. If the session is not over, the guide will continue from the last listing displayed.

While a background guide is displayed, pressing the background guide command key will toggle presentation of the setup menu. Another mode can be selected without ending the current session. For example, a single channel mode can be selected and scrolled over the current time-period. Pressing the background guide command again will toggle back to TV viewing with a background guide.

2) Single channel scroll. This mode may be selected by pointing to the Single Channel mode in the setup menu, or by entering the number #2 key. The single channel background guide is almost identical to the single channel foreground guide, except that only one or two programs is displayed.

a) Pressing the page up/down command will manually display listing for the selected channel. If the page key is held down for three seconds, or longer, the guide will scroll at a predetermined rate automatically in the direction of the selected channel key (up or down). To return to manual scrolling, press the page key momentarily and release.

b) Pressing either the up/down channel key will cause the listing to jump to the listing for the next channel.

c) The viewer can immediately change tuner channel to one that is displayed in the background guide by pressing the Enter key. The background mode is not exited, and the viewer may continue scrolling the background guide.

d) To exit, press TV or any other mode command.

e) Press the background guide command to resume listing. If a new session is not started, the first displayed listing will continue from the last listing scrolled before exiting the background mode.

Pressing the background command will open the setup menu. A different time-period can be selected if desired. Alternatively, the user can select New Session, to reset to the default time-period. Or the viewer can select another background mode. After the setup menu selection is completed, pressing the background guide command guide will restart display of the background guide.

3) Scroll according to the criteria setup for the guide. This background mode preselects display listing according to the guide mode that was last active. It can be the grid guide, or the theme guide. This mode provides an alternative way of viewing the listings normally seen on the grid guide or the theme guide, whichever was last viewed. Specifically, the start time is indicated by the leading edge of the grid guide cursor. The default time-period is 3 hours. This background guide will scroll through the listings of channels that are defined in the grid guide.

A typical application for this mode is as follows: assume that the viewer has started browsing the grid guide and decides to return to TV viewing. During the next commercial break, the viewer can open the background guide to resume

displaying listings of programs starting at the cursor position in the grid guide. This eliminates the need to specify favorite channels in the background guide duplicating the setup effort of the grid guide. Likewise, if the viewer was browsing the theme guide, the background guide will resume listings of programs at the cursor position in the theme guide. This eliminates the need for the reviewer to setup theme and sub-theme criteria in the background mode.

a) Pressing the Enter key will cause the tuner channel to change immediately to the listed channel in the background guide.

b) Pressing the page key will manually advance the listings. Momentarily holding the page key down for several seconds will cause the display to automatically scroll. Pressing any page key again will cause the scrolling to stop and to resume manual advancing of the listings.

c) To exit, press TV or any other mode command.

Channel Presentation on the Grid Guide

It is desirable to list programs in the order of most favorite channels instead of sequentially by channel number or alphabetically as in a printed television guide. A channel menu is provided to allow the viewer to arrange channel listings in the preferred order. In this way, the most favorite channels will be grouped together, on one or two pages, greatly reducing the need to perform channel paging. This is usually a one-time installation menu that allows the user to define channels that are favorites, and to be listed in the grid guide in a preferred order.

The channel select menu provides a list of all channels that can be received by a viewer. From this list, channels can be designated as favorites. Favorite channels are automatically given certain priorities. For example, in Me event that the schedule memory is insufficient to store all the listing information downloaded from broadcast, program notes and other descriptive information for non-favorite channels will be discarded before discarding such information for favorite channels. In case of severe shortage of memory space, listings for non-favorite channels will be discarded first.

The channel select menu also allows the viewer to decide on the listing priority of favorite channels on the grid guide. In one implementation, the channel select menu is a list of all channels, arranged in columns. The first column on the left, from top to bottom, will be the order in which channel listings will appear in the grid guide. Once favorite channels are designated, they will automatically be grouped together in the left-most columns. For example, if there are four favorite channels, such as CNN, DISN, HBO and SHO, it is possible to position SHO as the first channel in the grid guide. To do this, highlight the location where the new channel is to be moved. In this case, CNN is first highlighted. Next select the preferred channel, SHO. When this is done, CNN, DISN, and HBO will shift down one slot, and SHO will be entered into the first slot.

The channel select menu is maintained in a persistent (a non-volatile) memory and is used by foreground and background guides and serves as user input selection criteria when listing program in the grid guide, or to determine the order and which channels are to be listed in the background guide.

Grazing

Additional grazing features are illustrated in FIGS. **27**, and **28**A-B.

The following is a description of a more comprehensive grazing function that allows a viewer to retrieve guide information for other channels, without leaving the current channel and without significantly obstructing viewing of the current program. This grazing guide, consisting of a few lines of text, is displayed momentarily at the bottom of the screen.

The following implementation provides a consistent user interface for the various modes.

0. While viewing TV, pressing INFO will pop-up a Grazing Title for the currently viewed program.

1. To see grazing titles for other channels, without leaving the current channel, press the UP or Down arrow keys to change the channel of the displayed information. The Up and Down key will shift through a set of channels determined by the selected grazing mode, as explained below.

2. While the Grazing Info Pop up is open, pressing the Left or Right arrow keys will open up a list of grazing modes (displayed horizontally across the bottom of the screen). The last established mode will be highlighted when the Right or Left key is pressed first pressed. This mode list will momentarily displayed (hiding the Grazing Title) each time the Left or right arrow is pressed. After about two seconds, the mode list will disappear and the Grazing Title will-reappear.

While the mode list is displayed, pressing the Right key will select the mode to the right of the current mode, and pressing the Left key will select the mode to the left. The newly selected mode will be highlighted and the previous selected mode will be de-highlighted. Repeated pressing of either will toggle through the following Grazing Title modes:

a. By favorite channels (channels selected using the favorite channel menu).

b. By movies channels (channels now showing movies).

c. By sports (channels now carrying sports programming).

d. By Pay Per View (all channels carrying PPV programming)

e. By Theme. These are the channels that currently meet the Theme criteria that was last established in the Theme menu.

3. Two seconds after a new mode is selected, the mode list vanishes and the Grazing Title for the newly selected mode will be displayed. In another two or three seconds, the Info Pop up will also vanish, restoring the screen to full TV display.

4. Channel Count for each mode.

Some modes, particularly certain submodes of theme, may be so narrow that no channels meet the selection criteria. To inform the viewer in advance, a channel count for each mode will be displayed alongside the mode label. This count is a tally of all channels that are broadcasting shows meeting the mode criteria. If the viewer selects a mode with no (0) channels, a "No channels are available" message will be displayed.

Grazing Titles on Channels Other than the Current Channel

The user may wish to find out what programs are airing on channels other than the current channel without retuning and without obstructing the view of the current program. This can be accomplished by pressing the UP or DOWN arrow keys while viewing TV.

When the user presses UP, the Grazing Titles pop up for the next channel in the uses favorites order is displayed. In the same way, when the user presses DOWN, the Grazing Titles pop up for the previous channel in the user's favorites order is displayed The Grazing Titles pop up remains on the screen for two seconds, the same amount of time Grazing Titles pop ups remain on the screen during normal channel grazing.

While a Grazing Titles pop up for a channel other than the current channel is on the screen, most of the keys have the same functionality they have in normal TV state with Grazing Titles; however, there are three whose functions are altered.

It should further be apparent to those skilled in the art that various changes in form and details of the invention as shown and described may be made. It is intended that such changes be included within the spirit and scope of the claims appended hereto.

What is claimed is:

1. A method of navigating a database of television program listings for a plurality of channels in user television equipment, the method comprising steps of:

storing in electronic memory a list of channel indicators for the plurality of channels, the list comprising first and second channel indicators;

displaying in a first menu on a screen, the first channel indicator with a corresponding first television program listing and the second channel indicator with a corresponding second television program listing;

displaying the list of channel indicators in a second menu on the screen;

receiving a user selection, from the list of displayed channel indicators in the second menu, to move the first displayed channel indicator from a first location in the list to a second location in the list relative to the second displayed channel indicator;

arranging the list of displayed channel indicators in a user determined order based at least in part on the user selection; and

as a result of the user selection, automatically changing locations of the first and second channel indicators and the corresponding first and second television program listings that are displayed in the first menu to new locations in the first menu that correspond to the order in which the channel indicators, displayed in the second menu, are arranged.

2. The method according to claim **1** wherein the arranging step comprises:

reordering the list of displayed channel indicators by moving the first displayed channel indicator from the first location to the second location.

3. The method according to claim **1** wherein the user selection comprises dragging the first displayed channel indicator from the first location to the second location using a cursor.

4. The method according to claim **1** wherein the user selection comprises selecting the second location for the first displayed channel indicator, and wherein the arranging step comprises:

transferring the first displayed channel indicator from the first location to the second location.

5. The method according to claim **1** wherein the displaying and receiving steps comprise:

displaying each of the channel indicators including the first and second channel indicators in a sequence; and

receiving a user selection of a priority for each of the plurality of channels as an associated channel indicator is displayed.

6. The method according to claim **5** wherein the step of displaying each of the channel indicators comprises displaying a channel label for each of the plurality of channels.

7. An electronic program guide for user television equipment, comprising:

means for storing a list of channel indicators for a plurality of channels, the list comprising first and second channel indicators;

means for displaying, in a first menu on a screen, the first channel indicator with a corresponding first television program listing and the second channel indicator with a corresponding second television program listing;

means for displaying, in a second menu on the screen, the list of channel indicators;

means for receiving a user selection, from the list of displayed channel indicators in the second menu, to move the first displayed channel indicator from a first location in the list to a second location in the list relative to the second displayed channel indicator;

means for arranging the list of displayed channel indicators in a user determined order based at least in part on the user selection; and

means for, as a result of the user selection, automatically changing locations of the first and second channel indicators and the corresponding first and second television program listings that are displayed in the first menu to new locations in the first menu that correspond to the order in which the channel indicators, displayed in the second menu, are arranged.

8. The electronic program guide according to claim **7** further comprising means for arranging the plurality of channels in a time and channel listing guide in the user determined order of displayed channel indicators.

9. The electronic program guide according to claim **7** wherein the receiving means comprises a movable cursor displayed on the guide to receive a user selection of the first displayed channel indicator, wherein the first displayed channel indicator is moved from the first location to the second location.

10. The electronic program guide according to claim **8** wherein the displaying and receiving means comprise:

means for displaying each of the channel indicators in a sequence; and

means for receiving a user selection of a priority for each of the plurality of channels as an associated channel indicator is displayed.

11. The method according to claim **1** further comprising sequentially displaying television programs in response to user channel change commands, wherein the television programs are displayed sequentially in an order corresponding to the user determined order.

12. The method according to claim **1** further comprising:

receiving user scan commands; and

sequentially displaying television programs in response to the user scan commands, wherein the television programs are displayed sequentially in an order corresponding to the user determined order.

13. The method according to claim **1** wherein the user determined order is a preferred order based on viewer interest.

14. A system for displaying an electronic program guide, the system comprising:

a memory for storing a list of channel indicators for a plurality of channels and a plurality of television program listings, each of the plurality of television program listings corresponding to one or more of the plurality of channels, wherein the list of channel indicators comprises first and second channel indicators;

a screen for display, in a first menu, the first channel indicator with a corresponding first television program listing and the second channel indicator with a corresponding second television program listing; an input device coupled to the memory for receiving user commands; and

a processor coupled to the input device, the processor configured to:

display the list of channel indicators in a second menu on the screen;

receive a user selection, from the list of displayed channel indicators in the second menu, to move the first displayed channel indicator from a first location in the list to a second location in the list relative to the second displayed channel indicator;

arrange the list of displayed channel indicators in a user determined order based at least in part on the user selection; and

as a result of the user selection, automatically change locations of the first and second channel indicators and the corresponding first and second television program listings that are displayed in the first menu to new locations in the first menu that correspond to the order in which the channel indicators, displayed in the second menu, are arranged.

15. The system of claim **14**, wherein the processor displays the list of channel indicators on the monitor in a predetermined channel order.

16. The system of claim **15**, wherein the predetermined channel order is a numerical order.

17. The system of claim **14**, wherein the user selection comprises dragging the first displayed channel indicator from the first location to the second location.

18. The system of claim **14**, wherein the processor is further configured to:

receive a user selection of the second location;

move the first displayed channel indicator to the second location; and

move at least a portion of the displayed channel indicators one position in a predetermined direction.

19. The system of claim **14**, wherein the processor is further configured to:

display each of the channel indicators in a sequence, and receive a user indication of a priority for each of the plurality of channels as an associated channel indicator is displayed.

20. A system for viewing television programs, the system comprising:

a tuner;

a memory for storing a list of channel indicators for a plurality of television channels, the list comprising first and second channel indicators;

a screen for displaying, in a first menu, the first channel indicator with a corresponding first television program listing and the second channel indicator with a corresponding second television program listing;

an input device coupled to the memory for receiving user commands; and

a processor coupled to the input device, the processor configured to:

display the list of channel indicators in a second menu on the screen;

receive a user selection, from the list of displayed channel indicators in the second menu, to move the first displayed channel indicator from a first location in the list to a second location in the list relative to the second displayed channel indicator;

arrange the list of displayed channel indicators in a user determined order based at least in part on the user selection;

as a result of the user selection, automatically change locations of the first and second channel indicators and the corresponding first and second television program listings that are displayed in the first menu to new locations in the first menu that correspond to the order in which the channel indicators, displayed in the second menu, are arranged; and

command the tuner to sequentially tune to the plurality of television channels in an order corresponding to the order in which the channel indicators, displayed in the second menu, are arranged.

21. The system of claim **20**, wherein the processor displays the list of channel indicators on the monitor in a predetermined channel order.

22. The system of claim **21**, wherein the predetermined channel order is a numerical order.

23. The system of claim **20**, wherein the user selection comprises dragging the first displayed channel indicator from the first location to the second location.

24. The system of claim **20**, wherein the processor is further configured to:

receive a user selection of the second location;

move the first displayed channel indicator to the second location; and

move at least a portion of the displayed channel indicators one position in a predetermined direction.

25. The system of claim **20**, wherein the processor is further configured to:

display each of the channel indicators in a sequence, and

receive a user indication of a priority for each of the plurality of channels as an associated channel indicator is displayed.

26. The system of claim **20**, wherein the sequential tuning of the tuner to the plurality of television channels is in response to a plurality of sequential user commands.

27. An apparatus for displaying an electronic program guide, the apparatus comprising:

means for storing a list of channel indicators for a plurality of television channels and a plurality of television program listings, each of the plurality of television program listings corresponding to one or more of the channels, wherein the list of channel indicators comprises first and second channel indicators;

means for displaying, in a first menu on a screen, the first channel indicator with a corresponding first television program listing and the second channel indicator with a corresponding second television program listing;

means for receiving user commands;

means for displaying the list of channel indicators in a second menu on the screen;

means for receiving a user selection, from the list of displayed channel indicators in the second menu, to move the first displayed channel indicator from a first location in the list to a second location in the list relative to the second displayed channel indicator;

means for arranging the list of displayed channel indicators in a user determined order based at least in part on the user selection; and

means for automatically changing, as a result of the user selection, locations of the first and second channel indicators and the corresponding first and second television program listings that are displayed in the first menu to new locations in the first menu that correspond to the order in which the channel indicators, displayed in the second menu, are arranged.

28. An apparatus for viewing television programs, the apparatus comprising:

means for storing a list of channel indicators for a plurality of television channels, the list comprising first and second channel indicators;

means for receiving user commands;

means for displaying, in a first menu on a screen, the first channel indicator with a corresponding first television

program listing and the second channel indicator with a corresponding second television program listing;

means for displaying the list of channel indicators in a second menu on the screen;

means for receiving a user selection from the list of displayed channel indicators in the second menu to move the first displayed channel indicator from a first location in the list to a second location in the list relative to the second displayed channel indicator;

means for arranging the list of displayed channel indicators in a user determined order based at least in part on the user selection;

means for automatically changing, as a result of the user selection, locations of the first and second channel indicators and the corresponding first and second television program listings that are displayed in the first menu to new locations in the first menu that correspond to the order in which the channel indicators, displayed in the second menu, are arranged; and

means for commanding a tuner to sequentially tune to the plurality of television channels in the order in which the list of channel indicators, displayed in the second menu, are arranged.

29. The method according to claim **1**, the method further comprising:

retrieving, from the electronic memory, additional television program listings corresponding to the first and second channel indicators; and

displaying, in the first menu on the screen, the additional television program listings, wherein the additional television program listings are automatically positioned in the new locations that correspond to the order in which the channel indicators, displayed in the second menu, are arranged.

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